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Scottish Art and Architecture.

THE interesting volume which has been brought out by Mr. Brydall* is in some of its chapters rather a history of Scottish artists than of art in Scotland; at all events such names as those of Robert Adam and Wilkie certainly belong more to the history of English than of Scottish art. A history of artists who are Scottish in nationality would, when brought down to the present day, include some of the best known names among the members of the Royal Academy of England at this moment, the extent of the Scottish element in which is almost proverbial, insomuch that it has been insinuated that one of the best qualifications for an artist seeking election as an Associate is to be a Scotchman. But the volume contains a great deal of information in regard to the meagre remains of early Scottish art, the formation and history of the Scottish Academy, and the works and career of many artists of talent whose names are nevertheless little known south of the Tweed.

In the opening chapter on the sculptured stones belonging to the ancient period, the author refers to Mr. Billings's remark that among the Iona stones, along with sculptured forms believed to be very ancient when found on stones in other parts of the country, are found undoubted marks of much later origin, and that some which show characteristics of great age are inscribed with a date in the seventeenth century. This is accounted for by an ambition among some of the Highland chiefs "to appear in the character of Norman knights" (rather a curious way of putting it), and it is added that a document written between 1577 and 1595 mentions, in regard to the burying-place at Iona, "in this are all the gentlemen of the Isles buryit as yet." This accounts for these dates in a probable manner; but it would not explain the curious incident which we mentioned in connexion with the historic exhibition in the model of the Bishop's castle at the late Glasgow Exhibition, of the bagpipe with a Celtic style of ornament and a date 1500 inscribed upon it: an incident which perhaps suggests that there was even at that time such a thing as a taste for the archæological reproduction of the decoration of an older period.

We have no doubt Mr. Brydall is right in his estimation of the important amount of artistic work once existing in the architecture and furniture and decoration of Scottish Abbeys and other ecclesiastical buildings; nothing probably like what once existed in England, but still far more than might be hastily estimated from the extent of the remains and records of such work now to be found. It may be assumed that there was a greater extent of destruction of such work in Scotland than even in England, owing to the peculiarly strong anti-papistical feeling of the Scottish reformers; that this feeling was pre-eminently strong and stubborn in Scotland history leaves little doubt; yet it is curious, in respect to this, to read of the caution appended to a letter of instructions given in 1560 for the removal of all altars and "monuments of idolatry" from the churches. This document, signed by "Mr. Argyle, James Stewart, and Ruthven," is a circular of directions of this iconoclastic kind, of general application and with a blank left for the name of the particular church to be operated upon—"Traist friendis, after maist hearty commendaciown, we pray you faill not to pass incontinent to the kirk of ——, and take down the haill images thereof, and bring down to the kirk-zayrd, and burn thaym oppinly." Yet to this heartily-expressed commission is added the postcript "tak guid heid that neither the dasks, windocks, nor durris be ony ways hurt or broken, either glass wark or iron wark." When we compare this with the well known and dramatic account of the Cromwellite emissary in England breaking the stained windows of Canterbury Cathedral with a pole—"rattling down proud Beckett's bones," one cannot but wonder at the apparently greater tenderness towards the windows in Scotland. It is probable however that this is in reality a piece of the "canny" instinct of the north country, which would not readily destroy anything that was necessary to keep the church habitable for service, and which it would be an expense to replace. Perhaps we may also read it as an indication that there was not much stained glass work in the Scottish churches. The author indeed mentions that almost the only fragments of ancient stained glass left in Scotland are those pertaining to the old Maison Dieu in Edinburgh, "containing the Scottish arms and those of the Queen Regent, Mary of Guise, encircled respectively by a crown of thistles and laurel, with other armorial bearings, and the figure of St. Bartholomew, who has strangely escaped from the destruction of his brother Apostles there in 1559. In these fragments, while the figure is inferior to the other parts, the deep ruby and bright yellow on the Royal Arms exhibit traces of a bold broad manipulation and richness of colour, shewing a good appreciation of the glass-stainer's work." Possibly the importance and prominence of the armorial bearings acted as a protection to the figure of the saint. But if there had been anything like the amount of mediæval stained glass in Scotland that there was in England, it seems likely that by similar chances some other relics of it would have escaped to tell the tale; and we imagine that the direction to spare the church glass points in the same direction, and that it was mostly plain glazing not obnoxious to the Reformers.

The author indicates the early seventeenth century as the period when the modern form of architecture began to be developed in Scotland; later than in England, as England was later than the Continent, the spirit of the Renaissance travelling slowly northward towards the outer zone of civilisation. Among the first names of the period when architects began to be known by name is mentioned that of William Schaw, "Master of the King's Works" to James VI., who died early in the seventeenth century, and restored in 1594 the Abbey of Dunfermline. A part of the translation of the Latin inscription on his tomb shows that he was held in high honour, and spent no little pains in the studies whereby he rose to eminence: "he had travelled in France and many other kingdoms for the improvement of his mind; he wanted no liberal training; was most skilful in architecture; was early recommended to great persons for the singular gifts of his mind; and was not only unwearied and indefatigable in labours and business, but constantly active and most vigorous, and was most dear to every good man who knew him:" an architect's epitaph that should not be forgotten. The family of the Mylnes succeeded to eminence in architecture; beginning with John Mylne, several of whose predecessors had however also held the office of Master-mason to the King; there is also mention of Alexander Mylne a sculp-

* Art in Scotland; its Origin and Progress. By Robert Brydall, Master of the St. George's Art School at Glasgow. Edinburgh and London: Blackwood & Sons. 1889.

tor (probably, the author says, the brother of John) who died in 1643, and on whose tomb in the cemetery by Holyrood it is recorded that

> "What Myron or Apelles could have done
> In brass or paintry, he could that in stone."

Another Mylne was concerned in the building of Holyrood Palace; and a later member of the same family was the Robert Mylne born at Edinburgh in 1734, whose name is well known as the architect of old Blackfriars bridge, and who was afterwards surveyor to the fabric of St. Pauls.

It is only after the lapse of a good many chapters in the book that we return to the subject of Scottish architects in the eighteenth century, about the middle of which century died William Adam, the father of his son, and James Gibbs of Aberdeen. William Adam made an essentially Scottish reputation, but Gibbs was certainly to all intents and purposes an English architect; the only building in Scotland with which his name is said to be probably associated is the church of St. Nicholas in his native city, which the author describes as "professing to be Classic, but of no particular style." He was one of the first noteworthy examples, perhaps, of the many eminent artists who, born in Scotland, have made all their reputation in England, and to whose names a history of Scottish art can hardly make any claim. To the ability of the still more eminent, or at all events more successful English architect of the period who was born in Scotland, Robert Adam (the son, as above indicated, of a true Scottish architect), the author hardly does full justice; perhaps in part owing to Adam's questionable taste in deserting his own country. Now, Robert Adam (for it seems to have been he who was the prevailing genius of the family) accomplished what few single architects in the world's history have accomplished; he made a recognisable style; not a very powerful one certainly, and not perhaps original in any separate detail; but with that harmony and completeness in itself which more than any other quality constitutes style. To say that its characteristics were "the introduction of large windows, often rather bald-looking for want of dressing, grouped three or more together, by a great glazed arch" can hardly be called a fair description; it is the selection of a detail which, after all, we have not noticed as especially prominent in his works; but the essence of his style does not consist in this or that separate detail, but in the harmony and completeness of the whole. The author gives a sketch of the curious history of the Adelphi scheme, and its financial failure. In speaking of Adam's early studies, we observe that he retains the spelling "Spalatro," which may be considered as abandoned now for the more correct "Spalato," doubtless an Italian corruption of *palatium*.

Among the artists to whom considerable space is given are William Dyce and Sir Francis Grant, concerning both of whom we confess it was news to us that they were both Scotchmen; their career and fame was entirely English; so was that of David Roberts. Indeed it seems to us, looking over the list of artists' named, that Raeburn was the only one of the highest rank who remained *de facto* a Scotch artist, and made his fame in his own country. Thomson of Duddingston had a reputation beyond the border, but his landscapes, though evincing genius, can hardly be said to keep their place. David Scott, a man of undoubted genius, remained a Scotch artist; the author observes that he has been called "the Scottish Michael-angelo," a comparison rather beyond the mark; his genius had some affinity with that of Blake, though he no doubt drew better than Blake and was (if one may be permitted to say so) more sane in his temperament. Several works of his are mentioned which are unknown, we imagine, to most English readers; among others a reference is made to his remarkable illustrations to the "Pilgrim's Progress." A copy of this work we came upon not long since in a seaside lodging in a little fishing village; a goodly thick quarto ensconced among the family Bibles. Many of the designs are very powerful, especially that of Christian entering the Valley of the Shadow of Death, where a deep shadow is thrown from a dimly-seen gigantic figure bending forward so that the top of the crowned head is seen; this design is quite in the spirit of Blake. Some very interesting details are given of Raeburn's manner of working, from which we learn that in painting a portrait he never made any preliminary outline of the head or figure, but drew it in at once with the brush. Among the sketches of deceased Scottish artists of recent days we notice that one of the most distinctly Scottish in reputation, Sam Bough, was by birth an Englishman. The short biography of him is very interesting, for the personality of the man was as powerful and original as that of his paintings.

Mr. Brydall has produced a very interesting book which will fill a gap in libraries of works devoted to art. While on the subject of art in Scotland it will not be out of place to mention anôther book dedicated to our special branch of art as illustrated in Scotland, namely, the third volume, and a volume of goodly bulk and thickness, of Messrs. MacGibbon and Ross's "Castellated and Domestic Architecture of Scotland."* The authors are now endeavouring to carry out the scheme which they announced, and for which they asked assistance and information at the close of their second volume, of extending the scope of the work so as to include an account and illustrations of every old castle in Scotland; a fourth volume is to follow, and it is intended that there should be a complete record of this class of buildings. This is a very spirited effort, and deserves all recognition. We devoted considerable space to the first two volumes, and it is perhaps only necessary to say here that the third volume is carried out with the same completeness and the same large proportion of plans, sections, and sketches, as the former ones. The plans alone form a most valuable and interesting collection. We have never been able quite to like the style in which the views are drawn; it is rather mechanical and too much overdone with shading lines; but it fulfils all the practical purposes of illustration. Naturally the examples are not of quite the same interest as in the first two volumes, since in those the scheme of complete illustration had not been entered upon, and the most remarkable examples were of course selected; but everyone interested in the subject will be glad to see it thus continued. Among the more picturesque and characteristic examples in the third volume are Meggernie Castle, with its modest dormers ensconced between the square corbelled-out towers at the angles, and Sorn Castle, shown in two small elevations, a solid block of masonry with a great machicolated cornice and angle-turrets, and the windows set out in a very picturesque manner; the well, or rather well-cover, from the Mansion-house at Greenock, with its pyramid of masonry carried on thick cylindrical columns at the angles, is a curious and unusual bit of work, dated 1629. We hope to be able to congratulate the authors soon on the appearance of the fourth and concluding volume of their interesting and valuable book.

Canal Work in Russia.—It seems probable that the Russian Government will shortly begin the construction of the great canal between the Onega Lake and the White Sea, connecting that sea with the Baltic, plans for which have been for some time under consideration. It is estimated that the length will be 235 kilomètres, of which 138 kilomètres are natural canal, whilst the depth is to be three mètres. The cost of the canal alone is estimated at seven and a half million roubles; but with a harbour constructed at Wyg, on the White Sea, and dredging of the river Svir, the cost will be ten million roubles.

* The Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth Century; by David MacGibbon and Thomas Ross, architects. Volume III. Edinburgh; David Douglas; 1889.

THE LATE SIGNOR BRENTANO.

BY PROFESSOR MELANI, OF MILAN.

WE have referred already to the lamented and untimely death of Giuseppe Brentano, the young Milanese architect, who was victorious in the celebrated competition for the façade of the Duomo at Milan. He closed his career as an artist with an enormous success, which gave him a position such as many would have been well content to earn at the end of a long and laborious life; and has passed away without even seeing the commencement of that work to which he devoted his ceaseless attention, in order that he might make it more worthy of the monument it was to complete.

Giuseppe Brentano was born in 1862. From his early youth he cherished the idea of becoming an engineer, and had attended the technical classes at the Polytechnic, in which he became a pupil, and left these in 1885. When a student at the Polytechnic, Brentano obtained his great triumph, not by the display of his qualities as an engineer, but rather as an architect; a fact which is the more worthy of remark, as the Polytechnic school in question does not offer any special facility or inducement towards the study of architecture. Not that architecture is not studied in the Italian polytechnics, but the study of art does not form any organic element in these institutions, because in them those who belong to the architectural and engineering sections have to frequent for a short time some schools of the Institute of Fine Arts, together with the pupils who have devoted themselves to art, and not to science.* The students in these polytechnics benefit very slightly from the artistic instruction in the fine art schools, and are all wrapped up in their studies in the science of construction. In practice they are excellent engineers, whereas as architects they do not go beyond mediocrity, even if they reach that stage, owing to the insufficiency of their artistic training.

However, Brentano was evidently born an architect rather than a scientist, and he left the Polytechnic of Milan with a disposition more susceptible to the attractions of art than to those of science.

In fact, while still at the Polytechnic, a competition was opened at Siena, among the architectural students, for a scholarship, and young Brentano was among the competitors. The subject was a plan for a building for a given purpose, and a study on the history of art. Brentano was successful in this competition, and it was on this occasion that I came to know him personally. Knowing that I had successfully competed in a similar affair in Tuscany, Brentano called on me, and sought from me some information on this matter. I gave it to him very willingly, and encouraged him, after having seen some of his works which he brought for my inspection, and (as he added with extreme courtesy) for my opinion. Brentano wrote me several long letters from Siena, and when he returned to Milan again called on me with his work executed there. I conceived a very favourable opinion of it; but at that time I was much better pleased with a series of water-colour drawings, evincing a bold picturesque spirit,—drawings taken from remains at Florence and at Siena. These were, for the most part, fragments of Mediæval architectural works, to which, Brentano remarked, he felt himself drawn more than to any other style of architecture. The year after this first success, Giuseppe Brentano was made a qualified architectural engineer, and at the annual exhibition of the Institute of Fine Arts he exhibited a design in the Tuscan Mediæval style, which was, if I remember rightly, a very faithful reproduction of the celebrated

* The Italian fine art institutions have an architectural course, in which, together with architectural composition, ancient and modern architectural styles are also taught. The youths who attend these courses are not trained in construction, and hence they cannot exercise the art practically as architects, although even they may come out triumphant in the competitions for large public buildings.

Tabernacle of Orcagna in Or San Michele at Florence; he also exhibited a series of crayon sketches, of extreme delicacy, characterised by exquisite taste. Thenceforth, he was a recognised astist. Then came the International competition for the façade of the Duomo at Milan, and he was immediately urged to compete by his friends. At first the subject of the competition appeared to Brentano beyond his powers and studies (this the writer heard from his own lips), but subsequently he entered on the task, and exhibited two schemes at the preliminary competition; one of these was flanked by two towers, and one was without towers. In these designs there was, to say the truth, a good deal of uncertainty as to the system of treatment to be adopted; but passing over this fault in the two studies by the young Brentano, it was undeniable that in them he proved himself to possess greater strength than he had credit for; in fact, such was the power he evinced, that he was justly selected to be one of the fifteen competitors in the second competition. I can remember the great interest which the two schemes submitted by Brentano awakened in the public mind, because they were submitted in their original form, in the shape of rough sketches and as unelaborated designs, and the interest was so great that very high hopes were at once entertained of him. They showed, in fact, that the author had yet much more to say after these,—his first two efforts,—and the result proved it.

Selected as one of the competitors in the second competition, and before setting to work, Brentano paid a lengthy visit to Germany and Austria, and having secluded himself at Vienna, he devoted several months to work under Hasenauer, the celebrated architect of the Burg Theatre and of the Museum of Fine Arts and Natural Sciences at Vienna; he did this for the purpose of becoming more skilled in that Gothic style which had now become his ruling thought.

Brentano laboured, not only in the studio, but outside it, and wherever he went he carried away with him numerous studies and sketches. After this ample and opportune preparation, he set himself to work, and as soon as his plans were submitted many who saw them foretold the result. When the Exhibition was opened, Brentano at once gained admirers, and as a rule those who had not the courage to support his schemes were, at any rate, of opinion that none of the other competitors (Ciaghin, of St. Petersburg, had died after the preliminary competition) had produced a work which was worthy of being executed. The truth is that Brentano had three other strong competitors, or rather two others, who, supporting his ideas of dispensing with the towers of the façade for the Milan Cathedral, had each of them submitted important designs.

However, Brentano came out of the competition victorious, and his victory was a substantial one, almost without opposition, for he received twelve out of fourteen votes.

Thus it was that the architect Brentano awakened for several years universal interest, and all wondered that such a young artist should have achieved a triumph in such a way, and in an international competition wherein many illustrious men had laboured, and the press published biographies of him, spoke of his works, and praised his talent.

I cannot say how much such a conspicuous success may have affected Brentano, but I can affirm that he made no boast of it whatever; so true is this, that when one of the leading Italian publishers asked him to publish the façade he had designed, he refused the invitation, and preferred postponing it until after the sketch had been executed as a model, for which purpose he required the assistance of several of his colleagues. But, alas! poor Brentano never even had this satisfaction, and when he had barely commenced to execute his model in wood, according to the conditions of the programme, he was attacked by typhoid fever, and died in Milan on the morning of Dec. 31, 1889.

The jury who had declared the scheme of the young Milanese architect to be not only the best, but also one worthy of being executed, had also evinced the desire to see the crowning of the centre compartment somewhat raised,* in order that the centre feature might be more elaborated than the one shown in the plan. And it appears that Brentano himself was convinced as to this requirement, as also were many at Berlin and elsewhere. Consequently, Brentano had recently devoted himself to working out a different solution of this problem, which, indeed, was far from being a simple one. The fact is, so far as is known, and judging by the recent declarations made by Brentano, that he had not definitely accomplished anything in this direction which would serve as a guide to the modeller Brambilla.

As to the model, it was executed on a scale of 1-20, or, rather, of 1-21; that is, the full size of Brentano's original design. And as it was begun it will now be completed, on the very clear lines traced out by the young architect. Fortunately, the Cathedral authorities agreed on the necessity of having a simple model executed in wood, and this sample, consisting of one portion of a pier, will afford the modeller greater security in the interpretation of Brentano's conception, because it is executed under his own direction and with his approval.† There is only one thing that will leave anything to be desired in the wood model, namely, the proposed variations in the central portion, a matter which it will be exceedingly difficult to proceed with under the present circumstances.

The reader may naturally ask a question on this point, Will Brentano's plan be carried out, or what are the probabilities as to its execution? The reply to this question is by no means easy. I must limit myself to conveying the opinions most in vogue, and the facts which are best known on this subject.

Your readers will remember what gave rise to the present international competition. It was the fact that a bequest was made by a Milanese citizen, Aristide de Togni, in 1884, amounting to 830,000 lire, for the façade in question. This bequest, although very large in itself, was a modest one when compared with the total sum required for a worthy façade to our cathedral; and it was left subject to a condition that, if within twenty years the sum, or a part of it, were not expended on the façade, it would go to the benefit of the city hospitals. Hence the necessity of opening the competition at once, and of stimulating it.

It is certain that there are a great many who even now do not believe that the façade of the Duomo at Milan will be carried out, and there are also many who think that, in spite of De Togni's bequest, the competition which recently took place was merely an academical one,—albeit, one which has left an important page in the annals of the cathedral. The great difficulty which appears at present obvious to every one, arises from the fact that our cathedral is not bereft of a façade; and that, consequently (say some critics), it would be a useless piece of extravagance to spend an immense sum in providing it with a new one from the mere desire of improving the style of the monument. The façade of the Milan Duomo, as it stands to-day, is far from being unworthy in the eyes of those who accept with serene impartiality any artistic manifestation which efficiently represents any period in national history, and you will easily understand that if the monuments of Italy were to be improved in style, even limiting ourselves to the most noticeable ones, an end would never come to a work inspired by the very partial judgment of epochs and circumstances. It may be replied that these ideas are not the ideas of our time, and that before opening an international competition with the solemnity which characterised the one for the façade of the Duomo at Milan, consideration ought to have been given to the responsibility assumed; but the fact remains that both in Italy and beyond its shores the idea of improving the style of the façade of our cathedral has opponents; but those who favoured it, having the majority on their side, succeeded, at all events, in bringing about the competition.

Some other difficulties in the way of the execution of Brentano's scheme also arise from the fact that, by its execution, the *ensemble* of the present façade would not be substantially altered. I should explain that at Milan there existed, and still exists, the false impression that the renovation of the façade should be executed not so much to improve the style of this portion of the monument as to give greater scale to the building. It is a fact that, as compared with the palaces designed by Mengoni and the great arch of the Galleria Vittorio Emanuele, the Duomo of Milan, looked at from the Piazza, presents rather a modest figure. Now, those who think thus, believed (and still believe) and hoped that the new façade would have corrected this obvious disproportion to the prejudice of the Duomo; yet seeing that after all the project to be executed would, from this point of view, leave things pretty much as they are, they do not appear to be overpleased with it; so that if they do not raise difficulties, they at any rate stand apart with a rather suspicious indifference.

There is also the question of funds, but this, in my opinion, is not so serious as might be believed. In works of this kind Milan would, doubtless, get the support of the Government, and probably the support of Italians generally, although, perhaps, not to a very large extent; yet Milan is the most industrial and the richest city of Italy, and could rely a great deal on her own resources. Her capitalists are not scarce, and their affection to the Cathedral which lends individuality to the city assumes a Chauvinistic character which in England would perhaps hardly be credited. Again, the construction of the façade to the Duomo does not merely mean its commencement and completion in a short space of time. It is probable that the cost would not be far short of ten million lire, according to an approximate estimate; but ten million lire should not be sufficient to alarm us when, as in the present case, the payment is distributed over a number of years. In this amount would not be included the campanile, which would not only be necessary, but indispensable to the Duomo, particularly after the façade was renewed.* But Brentano's scheme is being prepared to stand fire, for further criticism, in the shape of a model. A drawing is one thing and a relief-model is another; and there are people in Milan who are rather doubtful as to the result of this final proof of Brentano's scheme. I, who am a faithful chronicler of what passes before my eyes,—if an opinion were allowed me,—would say that if the relief-model does not succeed in awakening a very lively interest on the part of the public, then adieu to the façade. It would then, I believe, be buried among many other projects of the present and previous, and even earlier centuries.

But even after this proof, admitting that it does awaken the enthusiasm I have referred to, it does not follow that the work will be immediately commenced. The judgment of the international jury requires the sanction, first, of the Preservation of Buildings Committee of the Province of Milan, and secondly, of the Superior Board of Fine Arts, and when so many persons have a right to intervene and express their opinions, especially in questions of works that every one has an ambition to carry out, obstacles easily arise. But there is in favour of Brentano's project and of its execution this

* See the official report of the jury, p. 4.

† According to the programme of the competition, Brentano was to superintend the execution of this model in wood, after which he would have received the second half of the prize of 40,000 lire assigned to him (see the Programme of the competition, article 10). The continuation of the model is now being executed under the superintendence of the cathedral authorities.

* When Napoleon, King of Italy, in June, 1805 ordered the façade of the Milan Duomo to be completed, the façade at that time had its doors and pilasters decorated up to the first Baldacchini, and as the work was completed with some carelessness, the expense amounted to about four million lire, comparing the money of that time with its present value. (See "Il Concorso Mondiale per la Nuova facciata del Duomo di Milano." A. Guidini, La facciati del duomo di Milano attraverso I secoli, p. 197.)

fact, that on account of the lamented death of the architect, the scheme may gradually assume, I might also say, an impersonal character, and in this way it would have more than ever an absolute possibility of being carried out (since a committee might be entrusted with it, consisting of this one or that one who on their own merits might aspire to the honours which fell to the lot of poor Brentano).

At the present state of the work, then, there are those who have the fullest faith in seeing Brentano's façade commenced, and there are also those who have no such belief. For my own part, I withhold any decision until I see whether it "stands fire" as a model. And if this test is favourable, as I hope it may be, then no serious difficulties are likely to impede the commencement and the final completion of the work (except, of course, any national calamity); and then, indeed, Giuseppe Brentano will have a lasting and magnificent monument.

To add a few personal details as to the late architect: Brentano was gentle in manner, tall, thin, and pale in appearance, and particularly of late gave rise to many fears among his friends as to his health. He was accustomed to a life almost of luxury, and was in this way quite the opposite to the "Bohemian" artist, a fact worth noting in a city like Milan, where artists are, perhaps, more Bohemian than in any other artistic Italian centre. Brentano used to dress not only with faultless elegance, but even with extravagance. Being a very young man, and new to the life, he had not many acquaintances among artists, but he had many among the upper classes of residents, to which class he himself belonged. Thoroughly devoted to study, Brentano shunned every opportunity of publicity, and when recently at the re-election of the Communal Council he was asked to become a candidate for the Council, he returned thanks and refused; nor, indeed, would he have accepted any office which might have distracted him from his studies or occupied his time. I can also say in his honour that after his triumph he fled from the turmoil of the city as though to fly from the sound of the praises and the gaze of the curious, both of which disturbed him, and he also avoided even that notoriety which was almost inseparable from the nature of his studies, and the responsibility which his triumph had thrown on him. Nor do I exaggerate owing to the affection I bore to my young colleague, nor is it because I think it a duty only to allude to the good works of those who have gone before us, that in writing of Brentano I allude to his blameless life, and I would even have spared myself alluding to it were it not that it contributed to render the young Italian artist more dear to all who knew him.

Before concluding, I should say that the international competition for the façade of the Duomo appears to have been fatal to several of our young colleagues who took part in it. Brentano is the fourth architect among the competitors under thirty years of age who has died. The first was Téodoro Ciaghin, who is one of the fifteen who was to have presented himself in the second competition, and he died before being able to begin the studies requisite. Luigi Tabea, a young artist of Venice, who died at Trieste, was also a very formidable competitor; and Raffaele Cattaneo, an architect and a writer, whose name was connected with the splendid publication issued by the "Organia de la Basilica de S. Marco," at Venice.

ALFREDO MELANI.

Sheffield Municipal Buildings Competition.—In reference to our remark that a well-known Sheffield firm of architects was mentioned in the local papers as among the six selected competitors, the architects in question wish us to state that they did not, as we assumed, make this communication to the local press. The fact that it is known, in that case, seems to show how impossible it is to keep these matters secret, in spite of all the efforts made by the authorities.

NOTES.

THE re-opening of the Railway Rates Enquiry last week found the opposing parties no nearer agreement, though Sir Henry James was prepared with a proposal which may simplify matters somewhat. It is suggested that the objections not yet disposed of should be tabulated, and the reasons for making them shortly and concisely stated. The railway companies will then state the grounds on which they decline to comply with the demands made, and the Court would thus be in possession of a revised statement of the points still in dispute. Mr. Balfour Browne took an opportunity of stating that the attitude of the traders represented by him towards terminals was still one of refusal to recognise the right of the companies to make any charge for them at all. Certainly, as matters now stand, in the event of the terminals claimed being disallowed, the railway companies would claim a right to re-cast the whole of the schedules, so as to provide for them in some other way. The form in which they were directed to bring in their proposals gave them a fair ground for assuming that such charges would be dealt with on their merits; and they have adduced a considerable amount of evidence in support of the reasonableness of the sums claimed. The traders will doubtless have to address themselves to the task of rebutting this evidence, as far as they may find themselves able to controvert it, the Board of Trade being hardly the tribunal to decide upon the legal arguments connected with this matter. Much less time was occupied in the examination of witnesses last week than in the case of the representatives of the London and North-Western and Great Western companies, owing to the latter having exhausted so much of the general case for the railways, that there are only certain matters relating to their own particular systems for the other managers to deal with. In defending the proposed classification, Mr. Scotter, of the London and South-Western Railway, maintained that no classification which brought the whole trade of the country into eight classes could hope to be either theoretically or logically perfect. We might add that the modifications already effected as the result of this inquiry affords proof that a full discussion of it by all parties interested will go a good way towards rendering it practically perfect. Mr. Oakley, of the Great Northern Railway, has given his evidence, but the Midland Manager (Mr. Noble) is ill, and unable to attend. The solicitor to the latter Company,—Mr. Beale,—who attended several of the conferences which preceded this inquiry, appeared on their behalf. Unfortunately, Mr. Courtenay Boyle has since fallen ill, too, and this will necessitate the postponement of the inquiry for a time.

THE discussion on the County Council's proposed amendments of the Metropolitan Building Acts, at the members' meeting of the Institute of Architects on Monday, did not end in anything, the meeting wisely adopting the suggestion of one member that it would be very premature to commit themselves to any decisive expression of opinion, on short notice, on such a matter. On the proposals of the County Council we have already commented at considerable length. Some of the criticisms made on them by Mr. Woodward in a short paper were to the point and of value; some were superfluous or frivolous, and one can hardly say that a critic who finds such difficulty in understanding the wording of an enactment is in the best position to clear the minds of others about it. Mr. Woodward seemed to find the wording of the clause which the Institute print as No. 70, but which we received and printed, more fully, as No. 68 (see *Builder*, December 14, 1889, p. 22), quite unintelligible. The meaning of the words is about as plain as any legal phraseology could be; whether the powers to be taken under the clause are such as it is desirable that the County Council should exercise is a query we have already suggested.

AS in the case of the Royal Academy Gold Medal competition for Architecture, so in that of the Soane Medallion competition at the Institute (the subject being a school), no award has been made this year, except medals of merit to three competitors, Mr. E. W. Gimson, Mr. C. S. Spooner, and Mr. F. W. Bedford. This reservation of the Gold Medal and studentship is probably due principally to the unsatisfactory nature of the plans, though not much can be said for the designs in comparison with some that have been submitted in previous years. Among those selected for mention, the plans of "Nineteenth Century" and "Cedric" are totally devoid of system or of any perception of the actual working of the plan; that of "Georgian" (Mr. F. W. Bedford) is a better plan, but the eccentric colouring and drawing of the perspective view have probably contributed to put the author out of court. The detail elevation, however, shows talent and some originality. Of the Tite Prize designs, that to which the prize has been awarded (a stone screen to the entrance of a mansion) "Privacy," by Mr. J. C. Watt, is one of the best designs that has been made for this prize of late years, and is the only one that is in the running at all; the other three are very poor. The perspective is a delicately-executed pencil drawing showing a rusticated and panelled stone screen, with a high block containing a circular archway and gates, rising above the screen-line near each end; these gate-blocks rise somewhat high in proportion to the screen, and rather require connecting with the line of the screen so as to break the abrupt right-angle formed at the junction. This is however a refined piece of work and highly creditable to its author. The prize design for the Grissell Gold Medal (subject, a timber spire) by Mr. Walter Percival, is also an admirable set of drawings made out with great care, and showing no little originality of design; it is a kind of translation of a pinnacle and flying buttress spire into an essentially wooden form of design, which is very cleverly carried out. As a matter of construction, however, we should prefer to see a central vertical tie from the upper portion of the spire rather than depending only on bracing. The collection of drawings for this medal (eight in number) is generally good, which is gratifying, as this exceedingly useful and valuable prize has on some previous occasions not attracted anything like an adequate competition. Mr. Begg's drawings which have gained the Pugin travelling studentship fully justify the award; they are mostly pencil drawings, not highly finished, but drawn in exceedingly good style; a view of Lincoln Cathedral and another of Lincoln Chapter House are especially good. Mr. Macintosh's set of measured drawings of Pluscardyn Abbey, Elginshire, which have gained the Institute Silver Medal for this class of work, are evidently carefully done; they are not so attractive in appearance as the successful drawings for this prize have sometimes been, partly perhaps that the subject does not admit of it. Mr. T. E. Mowlem gains a medal of merit for measured drawings of Cranbourne Manor House for the same prize. The drawings done on tour by the Pugin Student of 1889 (Mr. C. E. Mallows), the Soane Medallist of 1888 (Mr. A. N. Prentice), and the Owen Jones Student of 1889 (Mr. H. V. Lanchester), are exhibited, and form three most interesting and excellent collections of sketches, especially the last-named set; they all thoroughly justify the awards made to their respective authors.

THE new headquarters of the Berlin police are now completed, and the various departments (both civil, political, and criminal) are now moving into their new home. The site on which the building has been erected has a superficial area of nearly 170,000 square feet, 114,000 of which have been actually built upon; so that this new Prussian "Scotland-yard" is the third largest building in Berlin (coming, in size, directly after the old palace and the new House of Parliament, which latter will not, however, be finished before 1894). The building con-

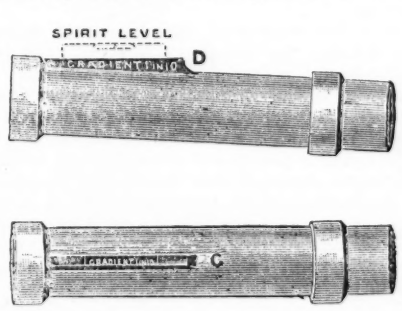
tains not only the head offices and the whole of the administrative department of the police, the official residences of its chiefs, and quarters for the "A" division of constables and detectives, but also detention cells (and all pertaining thereto—*i.e.*, baths, washhouses, kitchens, &c.) for 328 male and ninety-four female prisoners, stabling (with smithy, &c.) for sixty horses of the mounted police, and thirty horses for the transport vans, and a riding-school (110 ft. by 55 ft.). The planning is considered to be exceedingly practical; an interesting feature is the placing of the horses on two floors connected by a ramp with an incline up and down which the constables can with ease ride their horses. The elevations of the building are in red brick with facings of stone, and, although kept as plain as possible, certainly make a very favourable impression. The courtyards, the central one of which is covered, have their elevations in yellow brick with terra-cotta facings, and show some interesting detail. The building, which has been erected in less than four years, at a cost of 255,000*l.*, has been designed by and carried out under the superintendence of the city architect, "Stadtbaurath" H. Blankenstein.

WE understand that the Glasgow Harbour Tunnel is to be commenced at once in the hands of Messrs. Hugh Kennedy & Sons, Glasgow, whose offer has been accepted by the promoters. The tunnelling works, which will consist of three separate bores of 16 ft. diameter each, one for pedestrians and two for cattle and wheeled traffic, are to be reached on either bank by a perpendicular shaft 80 ft. in diameter, set well back, so as not to interfere with the quayage of the harbour, and worked on the hydraulic lift principle. Finnieston Quay, rather over half a mile below Glasgow Bridge, is the chosen place of crossing,—a point about in the centre of the busiest part of the harbour. The new ferry-boat of the Clyde Trust, designed to meet the same want, will ply not many yards away, and the two systems will be in rivalry, at least for a time.

FROM a report, in the Australian *Builders' and Contractors' News* of November 30, of a meeting of the Royal Victorian Institute of Architects, it seems that there is at Victoria a kind of taking-up of Ruskin afresh by architects, just at the time that in England people are beginning to discover the essential hollowness and weakness of much of his eloquently-worded criticism. Mr. H. D. Annear on the occasion referred to read a paper on "John Ruskin and Architecture," and a discussion followed in the course of which one of the speakers said that "though some of them might think Ruskin was too much up in the clouds yet instead of finding fault with him they should toil, patiently and painfully if necessary, after him." If the Victorian architects expect to get any real information on architecture from the study of Ruskin, we fear they will have to toil very painfully and patiently indeed, to accept fancies for facts, and to swallow a great many statements which are pure romance, and romance of a somewhat childish order. It seems rather a pity that this kind of thing should be beginning over again, somewhat after date, at the other side of the globe.

THE first experiences in navigation of the new Loch Lomond tourist steamer have been very trying, and are quite unique in character so far as British waters are concerned. She was lately launched from a Clyde yard, and a few days ago began the ascent of the River Leven, connecting the loch with the Clyde, over a short course of four miles. The Leven falls 20 ft. between its source in the loch and its mouth in tidal waters, but the fall is distributed pretty evenly over the whole distance, there being no lock or any other artificial work, and the result is a winding "rapid" of very considerable force, especially after rains, when the loch is parting with its surplus freely. The Leven is not navigable in any practicable sense, but it can be traversed by craft of very light draught when in flood, pretty much after the manner of the Canadian *voyageurs*. The old Loch Lomond steamers have not only been all of them built on the Clyde, and in this way tracked up the rushing Leven to the station assigned to them, but they have been brought down periodically for repairs, and in the same way returned. These movements were possible only after the craft had been stripped of all the weight-making portions of their fittings, short of engines and boilers, and including funnels and paddle-box rails, to admit of passage underneath the three or four rigid bridges which span the stream. The new saloon steamer built for the purpose is the largest that has ever attempted this short strip of peculiar navigation, and her experience has shown that the limit of burden is very narrow, and has now been all but overstepped. Abundant haulage power was available, consisting of several hundreds of men on either bank, and some scores of horses, but the stoppages were frequent, owing to grounding, and some of them lasted many hours, so that this short but trying passage of barely four miles ran into days. The current of the Leven is very capricious, swelling rapidly after rains within the great area of the loch watershed, and subsiding as rapidly in obedience to change in the opposite direction. In the case of sustained rainfall the passage is, of course, performed with more certainty, but there is always the risk of delay, even extending to weeks.

WE have received a circular describing what appears a useful and convenient appliance, patented by Mr. Irwin C. Wallas, sanitary engineer, of Kilburn, for testing the gradients of drains as each pipe is laid. This consists of a set of small hard wood blocks, accurately cut to various gradients, so that



on the application of the under-side of the block to a pipe to be laid at the specified gradient, the pipe can be adjusted, as shown by the cut, to the precise gradient required by the application of the spirit-level on the upper surface of the block: when that is proved level the pipe is at the gradient intended.

WE have received some examples of "S. Barter's Manual Training Diagrams" which consist of large coloured diagrams on glazed paper, or details of carpenters' and joiners' work, various forms of joints, tenons, &c. They will prove useful in technical schools and Polytechnic Institutions.

AT the Burlington Fine Arts Club are collected a number of drawings by the late Mr. Spencer Vincent, who enjoyed the distinction of being eminent both as an amateur athlete and an amateur artist. The drawings exhibited are few of them much finished, but there is plenty of good work in them, and many of them exhibit real genius in regard to the perception and rendering of colour-effect in nature. An interesting portion of the exhibition is a collection of sepia sketches made at the meetings of a sketching-club called "The Oo Society," on subjects given for the evening, and we presume treated by each member according to his own fancy. Among these "A well-known spot" (150), "Danger" (152), "A Storm" (154), and "Cloudland" (163) are especially good.

THE Victoria Gallery in Regent-street, where the "Humorous and Grotesque Exhibition" has been for two or three weeks open, is a prettily-arranged gallery for exhibitions, but unfortunately rather deficient in light on the ground-floor; the upper galleries are well lighted. The exhibition contains much that is of interest, though (in spite of its name) it strikes one as a rather melancholy display, in regard to the older works, of spite and ill-nature combined with vulgar and repulsive exaggeration. Rowlandson and Gillray were no doubt terrible caricaturists in regard to their power of giving pain, but they achieved this end by means which would happily be impossible to any caricaturist in the present day, both on the score of decorum and of artistic feeling; they were rather brutal than satirical in the true sense of the word. To art they made no pretence; and as to genuine humour and satire, Mr. Tenniel, Mr. Keene, and Mr. Sambourne are intellectually far beyond any satirical artists of the last century. Cruikshank too appears here as what he was, an artist immensely overrated even as a caricaturist. Hogarth, from whose works a fine set of engravings are here collected, is not to be ranked as a caricaturist, though he chose to be so occasionally; and it is absurd to exhibit his "Marriage à la Mode" and "Rake's Progress" in a "grotesque and humorous" exhibition; pictures more thoroughly serious and tragical were never painted. In general, in the contrast between old and modern humorous drawings, the exhibition may be said to recall the old Latin grammar quotation that Colonel Newcome was so fond of: "Ingenuas didicisse fideliter artes emollit mores"; and it is gratifying to think that modern culture and modern manners would no longer tolerate either such drawing or such brutality as was indulged in by Rowlandson, Gillray, and their weaker follower Cruikshank.

AMONG the correspondence on various subjects that usually assists to "pad" the *Times* when Parliament is not sitting have been two or three letters, as often occurs, on the subject of "street music," as it is facetiously called, meaning the instruments of torture called street organs and pianos. As usual, these inflictions and the vagabonds who turn the handle find their defender, this time in a wiseacre who signs himself "Blondel." We owe "Blondel" however one hint which may be turned to good account. He is obliging enough to suggest satirically that the words "nervous invalid" should be written on the houses of those who dislike street organs, and that the operator should be compelled by law to keep at a distance of fifty yards from such houses. It would no doubt be news to scribblers of the stamp of "Blondel" that there are thousands of persons neither nervous nor invalids, but possessed of sane minds in sane bodies, who regard the prevalence of the swarms of barrel organs that are allowed to infest the streets as one of the greatest curses of life in London, and a disgrace to its municipal government. But "Blondel's" suggestion may be turned to a better account than he thinks of. Let a bye-law be passed that all persons who object to these street pests may put up a small notice-board on their houses, "No organs allowed," and that on the affixing of such notice the organ-grinder should be bound to remain at fifty yards distance from the house without the tenant thereof having to invoke the intervention of the police; on the contrary, let the organ-grinder be liable to be taken in charge by the police on the mere fact of his being found transgressing within fifty yards of a placarded house. This simple arrangement would probably eliminate the organ-grinder. It would go hard if we could not find, in every respectable street, a series of persons separated by a distance of less than 100 yards from each other, who would be only too thankful to adopt this simple means of exterminating a nuisance which is yearly becoming more intolerable.

SPIRES, TOWERS, AND DOMES.*

A VERY forcible example of an ill-conceived tower is the leaning one of Pisa. The diagram on the opposite page is reduced from a measured drawing which was to a scale of 4·25 ft. to the inch.

The tower, circular upon plan, is nearly 178 ft. high, with an out-to-out base diameter of 50 ft., the height bearing a ratio to diameter of $3\frac{1}{2}$ to 1. The wall of the lower story is $13\frac{1}{2}$ ft. thick, and of the upper stories 9 ft. The tower is entirely of marble. The calculations explain themselves. The first item is the superficial area of the foundations. Then comes the cubic contents of the portion of the tower resisting overturn of the wind,—that is, of the exposed part from top to ground line. The weight of the marble is assumed at 170 lb. the cubic foot, and is expressed in decimals of a ton. The total weight of the portion resisting the overturn moment of wind is 15,325 tons (see diagram), and its moment about point A is 91,950 foot-tons.

Point A is $\frac{D}{4}$ from the leeward edge of the tower.

The peculiar case of this tower exhibits graphically the application of the previous remarks of the effect of wind upon cellular surfaces.

The reduction of the wind effect registered upon a flat surface, due to the circular plan of this tower, is annihilated by the galleries, in consequence of their forming cells for the reception of the full force of the wind in consideration of which a 60 lb. pressure has been calculated. The moment of this force about the point A is ridiculously below the strength of the tower, the ratio being as 1 is to $5\frac{1}{2}$.

The graphic resolution coincides—the distance of the centre line of the three lines marked on the diagram "lines of resolution,"—resultant from the centre of gravity,—only deviates two-elevenths of the distance between the centre of gravity and the point it would be absolutely safe at, showing that notwithstanding the severe inclination there is still a very large margin of safety against the overturning effect of wind.

Next as to the total weight of the tower upon the earth foundation. The soils in the neighbourhood of this tower are not noted for their weight-carrying powers.

The tower brings a pressure of $7\frac{1}{4}$ tons on the square foot, and at a fair computation, the soil, a sandy one, is only capable of sustaining $4\frac{1}{2}$ tons. This fact obviates the need of any further inquiry into the causes of the subsidence. The tower is thrown from $12\frac{1}{2}$ ft. to 15 ft. out of the perpendicular, has sunk bodily down some feet into the earth, which has since been excavated away from its plinth.

This tower is a unique example of useless masonry overloading its foundations, still standing, as it does, to tell the tale.

It would be safe to say, from the figures that are before us, that many thousand tons of masonry are in the structure which have no business to be there. It can easily be imagined what the fate of the cathedral would have been with the tower of Pisa joined to it.

The investigations of Canon Moseley, Rankine, and other noted American, French, and German scientists, have now taken a firm hold upon the constructive professions, and these researches are destined to have a far more weighty influence upon architectural construction than has hitherto been the case, tending to produce in our buildings the fullest economy of material consistent with practical needs and lasting stability.

Domes.

Of the numerous domes that have found existence in the last few centuries, how many can be said to be monuments of architectural and constructive skill? The last century has seen great strides made in many branches of science, and yet in the erection of domes, a field in which scientific knowledge could have such full scope, construction is drifting in a backward, rather than in a forward direction. The most recent dome (that for the tomb of the late Emperor of Germany) decides that the *dual* construction still holds the field, so that since the days of Wren there has been seen no legitimate advance in the matter of dome-raising, and it is the opinion of some that his step was to one side of the obstacle rather than over it.

The cathedral cupola of London was the first of a new race, and in its essential principles one which has been followed by each successive dome constructed of similar materials.

There is no need to recapitulate here the time-honoured theory of the construction upon which have been based the erections of recent centuries. High architectural authorities have satisfied themselves upon the point, and the casual student rests content. It must, however, be felt that the lighting difficulty has not received the attention it deserves as being really the pith of the whole problem. Suppose that the convex surface of the spherical dome, as seen from the exterior, is endowed with the importance and dignity that is consistent with the magnitude of the structure of which it forms part. Then, by nineteenth-century reasoning, the inside surface of this identical shell is unsatisfactory by reason of the unpleasant visual exertion required to grasp its contour,—a disadvantage due to the great distance from the dome to the level of the inside pavement. How can it be otherwise, when the dome shell, even on the St. Paul's plan, is in semi, if not complete, darkness?—a defect undoubtedly due to the system of admitting the light at the wrong place. There is a great deal to support this view.

In the opinion of many, there is no dome interior that satisfies the canons of artistic taste so completely as that of the Pantheon at Rome, an interior lighted directly from the sky.

Again, by universal consent, there is not a more inartistic and depressing dome exterior than that of the same Pantheon at Rome. The evil effect of the flattened appearance of the exterior and its piled-up abutments has been a more powerful factor in modern dome construction than has the principle, almost divine in its simplicity, of admitting the light direct from the heavens. The former has generated the dual and triple constructions of St. Peter's and St. Paul's, and most subsequent domes, while the principle of lighting from the eye of the dome has not been perpetuated with success.

It is not suggested that the great value of top-lighting for the dome has not been fully realised, but rather that its non-adoption has been due to the concomitant difficulties having proved too much of an obstacle to its realisation. What are these difficulties?

In the first place, artistic and even religious sentiment demands that the apex at the crown of the dome shall be surmounted by a lantern erection so as to annihilate the Mahommedan associations attaching to a bald domical sphere. But this very lantern as now built obstructs, rather than lets in the light.

With the example of St. Peter's before him, no dome constructor has again ventured to support a lantern erection upon a single spherical masonry or brickwork-coffered dome.

And however we may marvel at the unique construction of the great Sir Christopher, no architect of the present or coming centuries will venture to make such a large draft upon labour and material as was made in the construction of the three roofs to cover the one floor area of St. Paul's.

Granted that for architectural reasons the lantern is essential, then such lantern must be of such a design and of such a size that it conveys a bright strong light from the heavens to the dome interior. If this can be done the need for the dual system ceases to exist. Now the difficulty of carrying a heavy load in the shape of a large lantern at the apex of a spherical dome has hitherto proved insuperable. It will remain so while stone or brick is relied upon as the sole medium of construction.

The materials hitherto composing domical construction, though possessing a full complement of compressive strength, have not possessed that cohesive strength and tensile resistance in sufficient abundance to resist the aggravating bending moments set up by a load at the apex of the dome.

It will here be a fitting opportunity to review the mathematical theories involved in dome construction. So few investigators have brought their work to a practical conclusion, and fewer still have arrived at conclusions that are of the slightest value to the practising architect, that a *résumé* is not a formidable task. Upon the writings of Rondelet and Venturoli are based the calculations to be found in Gwilt. Mr. Merrifield read a paper many years ago before the Royal Institute of British Architects upon the dome of *uniform* stress, which showed the shape to be a parabolic cone—a conclusion already arrived at by Wren in designing St. Paul's. Lastly, Mr. Wyndham Tarn has put on record his views. His results, if anything, are more useful than those of the former writers, although he goes about his calculations in a similar manner to the method of Venturoli. His opening steps are common knowledge, and may be followed by any student. By the simple laws of mechanics it is shown that there are two forces generating moments about every point in the arch ring of the dome resting upon an abutment. These forces are the thrust at the crown acting with a leverage about each point in the arch ring, the amount of the leverage varying as the point under consideration alters its position, and the weight of the half-arch acting also with varying leverages about different points.

It must be patent to an observer that there is some point in the dome where the effect of the thrust is greatest,—in other words, where the dome is weakest.

The question arises, where is this point? Mr. Tarn, in a purely mathematical enunciation and proof, in which trigonometry, the calculus, and the higher algebra, involving cubical equations are introduced, demonstrates unquestionably from pure mathematics that the thrust is a maximum at a point 20 deg. from the springing and 70 deg. from the crown. This may be accepted as reliable, insomuch that on reference to some experiments made by a Mr. Bland on arches composed of wood voussoirs, after careful observation, it was seen that the voussoir first to give way under the thrust was at a point corresponding with Mr. Tarn's mathematic conclusion. At this point, of course, in a masonry dome, the chain would be placed, as has been pointed out.

Given the respective radii of the interior and exterior of a dome-shell, together with the weight of the masonry per cubic foot, the height of the pier, and, lastly, the amount of the thrust at the crown, then, from Mr. Tarn's data it is easy to calculate the amount of thrust passing from the dome to abutment, and the thickness necessary at the abutment to obtain equilibrium and also stability.

A remarkable dome is that over Sultan Mohammed's tomb at Gol Gomuz, at Beejapore. As far as our knowledge of it is correct, its construction is opposed to all modern ideas of good design, the thickness of the shell at the crown being no less than 18 ft., diminishing at various stages to 9 ft. 6 in. at the abutment. Whether it is solid at the thickest part is not known to the author; anyhow, it is the soundest dome existing without extraneous aids at the present time.

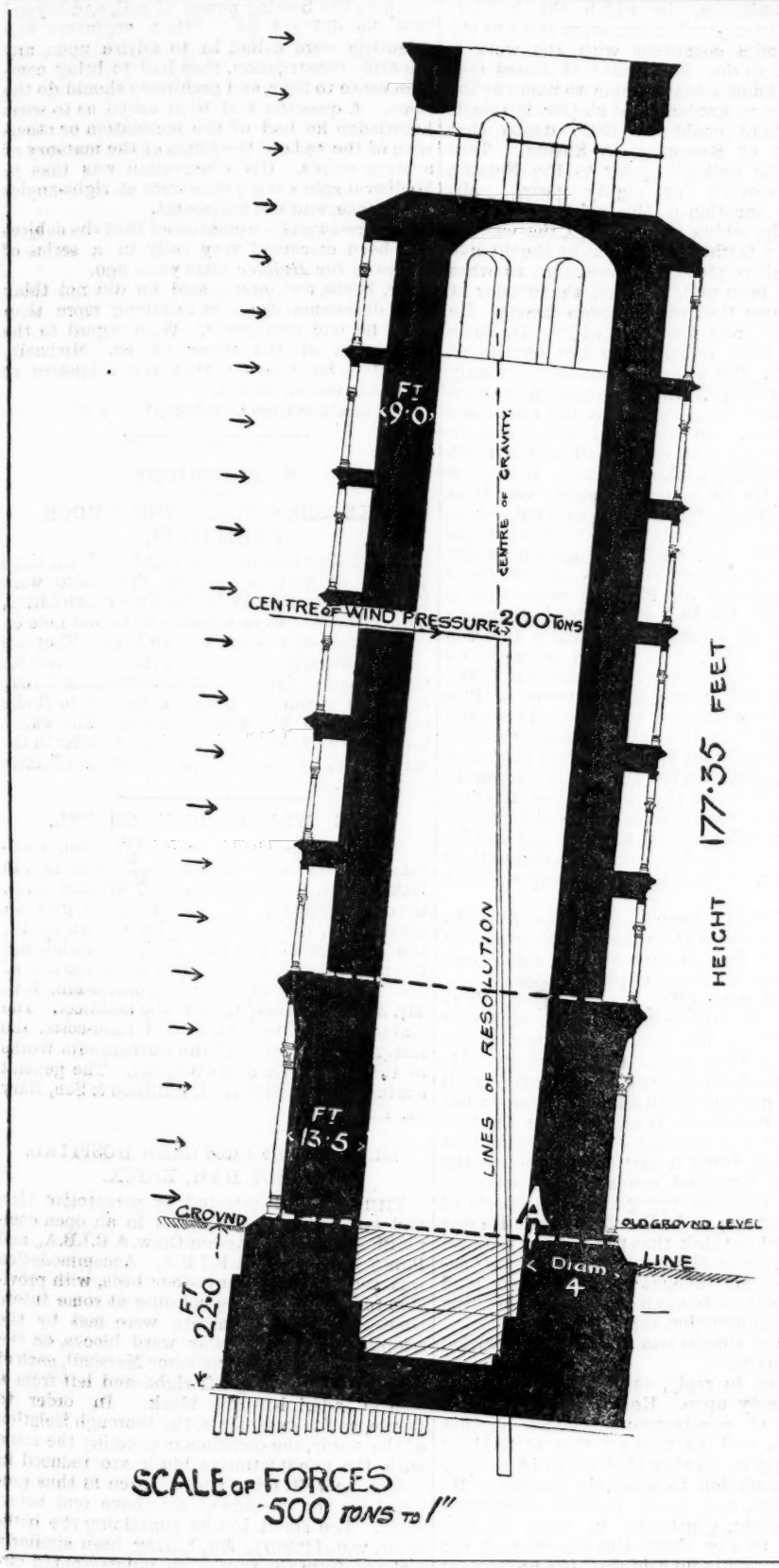
The days of masonry and brick domes existing solely as such are numbered, if not even now at an end. And if a dome, such as has been indicated here, can be constructed (and there is no reason why it should not be) satisfactorily from an architectural point of view, when viewed both internally and externally supporting a suitable and effective lantern erection, then the dual construction which has been the great bar to domical roofing development will be superseded, and an architectural sham be abolished for ever.

The question naturally arises, how can this be effected? The following suggestions have been roughly sketched out:—

The introduction of metal into masonry dome construction has had a precedent for a century past in the presence of the iron chain. But suppose the chains are entirely done away with, and a series of iron ribs are fixed radiating from the eye of the dome, formed by a circular metal curb, and abutting upon a similar curb at the base, the whole cross-braced and tied, and fixed upon expansion rollers. By such an erection a framework would be obtained, which could be calculated to resist any bending moment that might be brought upon it by a superimposed lantern, and no thrusts would be transmitted to the drum or abutments. The scheme for covering the metal framework is not a new one, insomuch that it was suggested some years back to construct a dome entirely of terra-cotta. The idea of the author is that terra-cotta would form a very suitable material for casing the whole of the metal framework, internally and externally alike, by blocks interlocking, and treated architecturally inside, with over-lapping joints externally.

Such a construction would produce a dome which, if suitably treated internally, would be satisfactory artistically, and constructively ex-

* Continuation of the paper by Mr. S. B. Beale, read before the Architectural Association on the 3rd inst. See p. 24, *ante*.



The Leaning Tower of Pisa.

Base area.. $61{\cdot}75^2 \times {\cdot}7854$	=	2985 super. feet
Contents :—		
Foundation $61^2 \times {\cdot}7854 \times 27{\cdot}6$	=	80660 cubic feet
Base ..... $39 \times 3{\cdot}14 \times 36{\cdot}75 \times 13{\cdot}5$	=	60755 ,,
Trunk .... $36{\cdot}75 \times 3{\cdot}14 \times 9 \times 117$	=	121505 ,,
Head..... $31{\cdot}68 \times 3{\cdot}14 \times 6{\cdot}5 \times 23{\cdot}6$	=	15263 ,,
Arcading.. $48{\cdot}75 \times 3{\cdot}14 \times 5 \times 19{\cdot}5$	=	14923 ,,
Columns, &c.		3270 ,,
		215716 ,,
Deduct for window and door openings, stairways, &c., calculated at		14080 ,,
		201636 ,,
Weight of a cubic foot of marble in tons		·076
Weight of portion of tower resisting overturn		15325 tons
Moment of weight about point A in Diagram 15325×6	=	91 950 foot tons
Moment of wind pressure about point A $42{\cdot}25 \times 177 \times {\cdot}0267 \times 88{\cdot}5$	=	17,700 ,,
Pressure of tower on the square foot of foundation $\{(201636 + 80660) \times {\cdot}076\} \div 2985$	=	7¼ tons
Safe pressure on the sq. ft. of damp sandy soil, at a depth of 22 ft. from surface $-\theta = 20^0$ = Ang. of Rep. $\left(\frac{1+\sin\theta}{1-\sin\theta}\right)^2 \times 22 \times {\cdot}0424$	=	4½ tons

ceedingly economical, compared in the light of the present accepted modes of dome construction—proof alike against fire, frost, and the dreaded hand of time.*

A few domes are illustrated upon the screens. That of Sta. Maria della Salute, Venice, of which there is a near view and a general one, exhibits an arrangement and general design that is pecularly graceful externally.

The remarkable central protuberance on the dome over the Pisa Baptistery is a feature more unique than elegant. To it may be traced, perhaps, the bulbous roof terminations on some Belgian and North German Cathedrals.

In drawing attention to the collection of photographs in this hall to-night, comprising as they do examples of many of the principal phases of tower, spire, and dome design, I would venture to say that they are a unique set. They form part of a fine collection gathered together in the course of some forty or more years. This portion numbers some 240 views. I feel the whole meeting is indebted to the gentleman who has placed these views at our disposal, Mr. James Cubitt, in whose service it has been my privilege to spend some little time; he published seven years ago some notes upon tower design, in which were classified towers of the Romanesque and Gothic styles under two great heads—towers with super-towers and towers without super-towers. Under these two divisions come some hundreds of types classed according to their plan, their roofing, their buttressing, etc. On the tabulated diagrams are scheduled the places where examples of the several types are to be found. The arrangement will repay careful study, and in thus directing attention to these views my paper concludes.

* This appears more than doubtful. Had the Pantheon been so constructed, it would not now be standing. —ED.

Mr. H. O. Cresswell, in proposing a vote of thanks to Mr. Beale, said he did not think there could be a doubt, as Mr. Beale had said, that they were very much indebted to the gentleman who had so kindly lent them the splendid collection of photographs which was exhibited on the screens. He had to confess that he was a little staggered at the vastness of Mr. Beale's subject,—"Domes, Towers, and Spires,"—when he saw it in the syllabus. Obviously, a great deal might be said and written under such a title, but Mr. Beale had wisely confined himself to one side of his subject, and his paper might be described as a plea for the scientific construction of towers, spires, and domes, and not only of towers, spires, and domes, but of all buildings. He did not think that any one would attempt to argue against that for a moment, for it would be absurd, with all the scientific knowledge of the present day, to blindly follow old methods of construction, where they were known to be faulty. They might all learn valuable lessons from the failure of Mediæval towers, but he thought they must not go too far in the direction of the advocacy of scientific construction at the expense of the æsthetic side of their studies. Mr. Beale had rather spoken as though the two sides of an architect's education were in antagonism, for he had much glorified the scientific side and thrown cold water on the æsthetic side (Mr. Beale: "No, no!") He, Mr. Cresswell) might have misunderstood him, but he thought it was necessary that they should learn to design before they attempted to construct. Of course, it was impossible to design a building without a knowledge of construction, but he thought that to teach a student how to calculate stresses and strains, before he had learnt anything of the artistic side of his profession, was putting the cart before the horse. He had been very much interested in Mr. Beale's application of scientific principles to the case of the leaning tower of Pisa, to show that it was unstable. His calculation as to the cause of the subsidence of the tower seemed to depend upon a factor which he understood was Rankine's factor of earth-pressures. But he wished to know whether that factor took into account the variety of strata of the earth, and whether it would assist a man who had to deal with earth beneath which there was a running sand or spring the existence of which was unknown to him? For it seemed to him that, under such circumstances, the tower of Pisa might have been constructed with a perfect knowledge of all Mr. Beale's calculations and yet might have failed. Mr. Beale, in speaking of the origin of towers and spires, and more particularly of spires, described the English examples as being very beautiful. Of course, they all admired them very much, but he thought that they must acknowledge that it was to Normandy that they owed the origin of the spire. Mr. Beale had mentioned one example in Normandy, which was the tower of the church of Thaon, a very early church, with a low pyramidal roof of stone to the tower, which was no doubt the first sprout, as it were, from which the later spires were developed. On the subject of detached towers, Mr. Beale had attributed the placing of bell towers in a detached position to the fact that they

would be likely to cause subsidences if they were joined on to the main building. He (Mr. Cresswell) did not think that was entirely the reason. He might be wrong; but in this country, he believed, one reason why towers were detached from the main building was that in early times they were used to a great extent as the strong places in the villages or towns in which they were erected. Many towers, particularly in the West of England, he had always understood, were detached, so that when the people suffered from raids across the marches by the wild men of Wales, they fled to their towers as the strong places of defence. Mr. Cresswell next referred to a list of fallen towers, which were nearly all central towers, and said that Mr. Beale had undoubtedly hit upon the weak point of such towers,—their being carried on four comparatively frail piers, resting on isolated points without any connexion with each other. But for the abutment afforded by contiguous walls, none of the old towers would have stood to the present day. Salisbury Cathedral was one of the most deeply interesting examples, for there they could see the various additions which had been made from time to time to prevent the failure of that spire; if those works had not been done the spire would have collapsed. That spire was said to be in a dangerous state within a short time of its erection, and was several times strengthened to preserve it, and the last restoration on a large scale was carried out by Sir Christopher Wren late in the seventeenth century. With reference to the æsthetic position of towers, he apprehended that with cathedrals in England, it was generally intended that they should have both a central tower and two western towers, and, if they would observe, they would see that that arrangement was suited more particularly to English cathedrals. In England their cathedrals were very long and low, and, consequently, a central tower became an essential and beautiful feature. In France, on the other hand, he thought that the reason of placing the towers and spires at the west end only was that their naves were so very lofty that if a tower had been put upon the crossing it would have had to have been a gigantic affair to tell above the roof. He thought that the French were thus compelled to build their towers at the west end on account of the height of their naves, and to be content with a small flêche over the crossing.

Mr. Arnold Mitchell, in seconding the vote of thanks to Mr. Beale, said that differences of taste and education lead them to form varied estimates of the different styles of art, but the most devoted follower of Classical antiquity could scarcely fail to appreciate the intrinsic beauty of the Gothic steeple. He was very pleased to have heard Mr. Beale emphasise that point in the opening remarks of his paper, although he might have emphasised somewhat more strongly the two distinct varieties of English towers and spires,—viz., the central and the western. Mr. Beale had not, to his mind, laid enough stress upon the fact that the central lantern tower was the legitimate descendant of the Byzantine dome, and that the western tower was the legitimate descendant of the Italian campanile. The little tower of the Church of St. Surplice, on the Lake of Geneva, showed in the most striking way the development which had taken place from the dome to the lantern-tower. At the crossing of the transepts, viewed from the interior, there was a perfect dome. Externally, however, it was a lantern tower. He thought that if they bore this fact in mind when viewing some of our English churches, they would find that some such development had taken place here. The Italian campanile was expressly intended for the hanging of bells, and, although Mr. Beale dissented from that view, it seemed to him (Mr. Mitchell) that he had not made out his case. Mr. Beale had stated that the thickness of the walls of the bell-towers constructed in accordance with the rule quoted by him was out of all proportion to the necessities of the case. Perhaps that was so, but Mr. Beale had gone a step further, and seemed to find fault with the Norman builders for making the walls so much thicker than they need have been. But it should be remembered that the Norman builders were feeling their way; they were building experimentally, so to speak, and did not at first fully understand what they could do with their material. How different was a Norman work, such as the tower of St. Alban's, as compared with an erection of the fifteenth century,—say such an example as that at King's College Chapel, Cambridge, in which the builders seemed to have pared down every stone to the smallest limits consistent with the work it would have to do. Mr. Beale had stated that he did not know what example to name as the earliest spire in England, but he (Mr. Mitchell) thought there could be little doubt that it was that of Sompting, in Sussex. That was a Saxon example, prior to the Norman ones by seventy or eighty years. Mr. Beale had mentioned the spire of Thaon, in Normandy, which was, perhaps, the earliest example of a Gothic spire. But he should like to add a curious piece of information to what had already been said, viz., that the interior of that spire was tied with wooden beams. He must dissent from the view which Mr. Beale had taken with reference to the entasis of spires. Mr. Beale had somewhat unfairly quoted Gaythorpe, where entasis had been carried to such an extent that the effect was almost hideous. An entasis of about 3 in. in 180 ft. of height was very small, and did not affect the stability of the structure. He should like to ask Mr. Beale one question, viz., How were the Mediæval spires constructed,—with the bed-joints horizontal or at right angles to the face? Mr. Beale had spoken of the peculiar formation at the top of the dome of the baptistery at Pisa, as suggesting a lantern; but he had not added that the excrescence in question was really the top of a large cone, which was carried up from the bottom of the large external dome. The case of the failure of the tower of Pisa could not be attributed to the wind pressure, for we knew that the builders, while building the tower, found that it was rapidly becoming out of the perpendicular, and it was curious to to notice how, when they had realised the fact that the tower was leaning, they had tried, by varying the thickness of the masonry and by making the colonnades on one side higher than on the other, to get it into the perpendicular again.

Mr. C. H. Brodie supported the vote of thanks to Mr. Beale, and said he thought their special thanks were due to him and to Mr. James Cubitt for the collection of photographs.

The Chairman (Mr. T. E. Pryce, Vice-President), in putting the motion, said that with regard to the position of towers, he thought that that was a matter of taste. He was more particularly speaking about the small parish churches scattered all over the land; but with great cathedrals it seemed best to place the tower at the crossing. Another thing that struck him as being a matter of taste was the building of detached spires in this country. They were common enough in some parts of England, notably so in Herefordshire. He was not disposed to think that the isolated position of the tower was always due to defensive considerations. He thought that the paper read that evening had been an extremely interesting one and the discussion especially so.

The vote of thanks was then put and carried by acclamation.

Mr. Beale, in reply, said he had very few points to reply upon. He had previously had experience of a scientific discussion at that Association, and he thought that it testified very strongly to his view that they did not pay sufficient attention to scientific matters. He had, perhaps, not made himself sufficiently clear to some gentlemen in what he had attempted to say about the diagram of the Pisa tower. What he said was that he thought the tower was perfectly safe against being overturned by the ordinary effects of wind. As regarded the settlement of the tower owing to the sinking of the soil, his calculations showed why it sank, because there was $7\frac{1}{4}$ tons on the foot on ground which was only capable of carrying $4\frac{1}{8}$ tons to the foot. Reference had been made to the fact that the tower had sunk before it was completed, but his figures would show that it would sink before it was half its height. The upper story, which was added much subsequently to the general erection, was made with a thickness which varied, so that the light section was on the lower side of the tower and the heavier masonry was on the upper side. There was an enormous excess weight of marble masonry used, or the tower would not have failed. He had been asked how his calculations would be of service in such an emergency as the unknown percolation of water beneath the structure; but, of course, all calculations of that kind must be taken in a practical spirit, as applying to known facts. His idea was to arrive at a mere estimate by which they might compute the bearing power of soil, and beyond that he did not go. When engineers and scientists were called in to advise upon any scientific construction, they had to bring common sense to bear, and architects should do the same. A question had been asked as to what knowledge he had of the inclination or otherwise of the beds of the joints of the masonry of ancient spires. His observation was that in Mediæval spires the joints were at right-angles to the face, and not horizontal.

Mr. Cresswell here mentioned that the subject had been discussed very fully in a series of letters in the *Builder* some years ago.

Mr. Beale, continuing, said he did not think that discussion came to anything more than what he had mentioned. With regard to the restoration of the tower of St. Michael's, Coventry, he thought that the thickness of the walls was excessive.

The meeting then terminated.

Illustrations.

SKETCHES FROM THE TUDOR EXHIBITION.

WE give this week a number of drawings of various bits of decorative work from objects in the Tudor Exhibition, most of which were alluded to in our note on the Exhibition a week or two back. They are selected of course, for their artistic and not for their popular interest, though the remarkable cup originally given by Queen Elizabeth to Drake includes both kinds of interest. The sword hilts, a few out of a considerable number in the Exhibition, are worth note for their effective treatment.

THE WEIGH-HOUSE CHAPEL.

THE Congregational Chapel, School, Institute, and Minister's House, having frontages in Duke-street, Robert-street, and Thomas-street, Grosvenor-square, W., of which we give an illustration, are now in course of erection for the Trustees of the Old King's Weigh-house Chapel, which formerly stood upon the site of the Monument Station, Fish-street-hill, E.C. Mr. A. Waterhouse, R.A., is the architect. The materials are red brick and terra-cotta, the latter manufactured at the Burmantofts Works of the Leeds Fire-clay Company. The general contractors are Messrs. J. Shillitoe & Son, Bury St. Edmunds.

DESIGN FOR PROPOSED HOSPITAL, WEST HAM, ESSEX.

THE design, illustrated by perspective view and key-plan, was submitted in an open competition by Messrs. Arthur Crow, A.R.I.B.A., and Philip Henry Tree, A.R.I B.A. Accommodation was required for twenty-four beds, with provision for extending the building at some future time. These requirements were met by the adoption of two circular ward blocks, on the system advocated by Professor Marshall, each of two floors branching off right and left from a central administrative block. In order to secure, as far as possible, the thorough isolation of the wards, the corridors connecting the same with the administrative block are reduced in height to 7 ft. 6 in., and a space is thus provided for the passage of air above and below same. The small blocks containing the bath-room, w.c., laundry, &c., having been similarly isolated from the wards, an uninterrupted circulation of air is obtained on all sides.

The administrative block contains, on the ground-floor, a casualty-room and matron's sitting-room, with access from central octagonal hall, and opposite the entrance a broad corridor leads to the operating-room, at the rear of the building, which is provided with lantern and north lights. Attached to the operating-room is a small consultation-room for surgeons, with w.c., lavatory, &c., in conjunction therewith. A board-room is also provided on this floor. An open well-staircase, planned to receive a patient's lift, leads to the first-floor, on which are placed a small suite of rooms for the resident surgeon, comprising sitting and bed rooms, bathroom, lavatory, and w.c. A convalescents' ward is provided in front of the building, with access to a balcony over entrance. A bedroom for the matron and a single ward are also provided on this floor. On the second-floor are placed the kitchen, offices, and bedrooms for nurses and servants.

As the very restricted nature of the site

would not permit of any ground being set apart as a garden for convalescents, provision was made for an airing-flat, with glazed shelter over each ward block, with access thereto by separate staircases from first-floor.

A small block, consisting of two wards and scullery, with w.c.'s and lavatories, was arranged so as to be entirely disconnected from all other buildings with a view to the immediate isolation of any infectious cases which might break out after admission to the hospital.

A mortuary, post-mortem-room, and disinfecting-chamber constitute a separate block, with access from sloping way forming approach for ambulances. In view of the many recent disasters in public buildings through fire, provision was made in this design for easy egress from each ward by means of an escape staircase leading from the bathroom lobby to the ground level.

The size of the ward was calculated on the basis of 100 superficial feet of floor space per patient, and arrangements for ventilation were made by the provision of fresh-air inlets under the head of each bed, in conjunction with the hot-water radiators, so that an ample supply of pure air of equable temperature could be secured for each patient, special flues of glazed stoneware pipe for the extraction of foul air being carried up in the central stack of flues. In addition to the hot-water radiators three open fire-places are shown in each ward. The internal finishings were intended to be of simple form, with a view to economy, as well as to facilitate the cleansing thereof, and to eliminate as far as possible all projections for the lodgment of dust, &c. The exterior of the building was also designed with due regard to economy, but at the same time a certain amount of character was aimed at to satisfy its demands as a public institution. With this end in view the walls were intended to be faced with red bricks in two tints, the strings, cornices and other features of the design being in terra-cotta.

THE OLD FOUNTAIN, MARKET-PLACE, MAINZ.

THE old Renaissance fountain in the Market-place at Mainz is a characteristic example of a certain school of Renaissance work. The fantastic agglomeration of corrupt ornament which forms the terminal of the triangular erection over the fountain is certainly in very coarse taste, yet there is a kind of power about its exuberance which to some extent atones for the bad character of the detail.

VILLA NEAR STRASBURG.

THIS house, called "Strassburg le Cottage," we give as a typical example of contemporary German taste in domestic architecture. Without expressing admiration for the style of architecture it represents, we believe all who are acquainted with the tendencies of German "picturesque" house architecture will concur with us in thinking that this is a favourable example rather than otherwise of the style of domestic architecture of modern Germany.

MEDALLISTS AND PRIZEMEN AT THE INSTITUTE.

AT the business general meeting of the Royal Institute of British Architects on Monday evening last, the following awards were made, viz.:—

Institute Silver Medal (and 10l. 10s.).—To Mr. Alex. Mackintosh. In the same competition, a Medal of Merit was awarded to Mr. J. E. Mowlem (Swanage).

Soane Medallion.—The Soane Medallion was not awarded this year, as elsewhere noticed. But in the same competition Medals of Merit were awarded to Messrs. F. W. Bedford, C. F. Spooner, and E. W. Gimson (Leicester).

Tite Prize (30l. and a certificate).—Awarded to Mr. James C. Watt, of Aberdeen.

Grissell Gold Medal (and 10l. 10s.).—Awarded to Mr. W. Percival, of Longton (Staffs). Medals of Merit awarded in the same competition to Messrs. J. A. Pywell and T. F. Pennington.

Pugin Studentship.—Awarded to Mr. John Begg. Medal of Merit to Mr. D. J. Blow.

Godwin Bursary.—Awarded to Mr. A. A. Cox.

Ashpitel Prize.—Awarded to Mr. Herbert Baker.

Scientific Masonry Prizes.—10*l.* 10*s.* to Mr. H. A. Woodington; 5*l.* 5*s.* to Mr. A. W. Anderson.

THE LONDON COUNTY COUNCIL.

THE London County Council held its first meeting since the Christmas recess on Tuesday afternoon last, in the Council Chamber, Guildhall, Lord Rosebery in the chair.

The Proposed Fountain at Piccadilly Circus.—The Improvements Committee presented a report, in which they said:—"We have proceeded upon the references of the Council relative to appropriating the vacant space at Piccadilly-circus, and we have considered various suggestions. The site in question is of triangular form, containing about 1,620 superficial feet, is a conspicuous and important one, and is therefore specially adapted for some ornamental object, although the surrounding buildings offer little or no architectural attraction. After mature consideration, we formed an opinion that an ornamental fountain, so constructed as to avoid splashing and the carrying of spray by the wind, would be the most appropriate method of utilising the site, and we gave instructions for designs to be prepared accordingly; but just at this juncture we received a communication from the Duke of Westminster, as Chairman of the Shaftesbury Memorial Committee, suggesting that the site might be appropriated to the fountain which the Memorial Committee had ordered to be constructed. We are unanimously of opinion that the spot in question, which is at the termination of Shaftesbury-avenue, is peculiarly suitable for a memorial to this distinguished philanthropist. We have seen the model at the studio of Mr. Alfred Gilbert, the sculptor, and we are assured that it will fulfil the conditions as to spray and splashing. The dimensions are apparently well designed, being as follows:—Height of fountain from base to summit, 30 ft.; height of platform, 2 ft. 6 in. The base of the fountain is octagonal, measuring 10 ft. 8 in. from face to face, surrounded by a platform 2 ft. 6 in. wide, and approached by six steps, the whole occupying an octagonal space of 23 ft. from face to face, and covering a total superficial area of about 450 ft. A margin of pavement would be left of 6 ft. in the narrowest and 21 ft. in the widest part of the present triangular plot. The model is not finished, and the artist hesitates to complete it until the site shall have been decided upon, because certain details will be designed to harmonise with the surroundings. It is, therefore, difficult for us to arrive at a definite decision as to its artistic suitability. We suggested to the Shaftesbury Memorial Committee that a model should be placed on the spot to afford an opportunity of judging of its merits, but again occurred the difficulty of its incompleteness. Neither are we in a position to provide a sketch for the inspection of the Council. Under these circumstances we recommend—

'That a communication be sent to the Duke of Westminster, Chairman of the Shaftesbury Memorial Committee, assenting to the erection of the fountain at Piccadilly-circus, but with the understanding that in the event of its not proving to be adapted for the site, or not receiving the approval of H. M. Commissioners of Woods, &c., as required by the Metropolitan Improvements Act, 1889, it shall be removed to some other spot, for which facilities will be given by the Council.'"

This was agreed to without discussion.

The Bethnal-green "Poor's Land."—The Parks and Open Spaces Committee submitted the following report:—"We have again had our attention called to the question of the waste land in the parish of Bethnal-green, known as the 'Bethnal-green Poor's Land,' adjacent to the Bethnal-green Museum Garden, which latter is already under the control of the Council. The Poor's Land is 6¼ acres in extent, and is subject to a trust, the provisions of which, since we last reported on the subject, viz, on April 9, 1889, have been dealt with in a draft scheme by the Charity Commissioners. The Commissioners propose that of the 6¼ acres, about one acre and a quarter shall be devoted as a site for a public library and town hall (the ground surrounding which to be open to the public), and that a further area of 2½ acres shall be given up for a site for a parish infirmary, leaving 2½ acres to be laid out and maintained as a public recreation ground. Having carefully considered this scheme, we do not consider that it should be adopted in its entirety, as too great a portion of what is now an open space would be devoted to building purposes. The Council, on April 9, 1889, passed the following resolution:—

'That the Council do communicate with the Charity Commissioners, and ascertain if they are prepared to agree to a scheme, to be promoted by the Council, for laying out and maintaining the Bethnal Green Poor's Land as an open space; that the Commissioners be requested not to agree to any scheme for building on the said land; and that the Parliamentary Committee be instructed to watch and report on any Bill promoted with respect to the same.'

At that time, neither we nor the Council were in possession of the details of the scheme of the Charity Commissioners. Now, however, that we have had an opportunity of considering the scheme, we have arrived at a conclusion which we think would effect a fair compromise between the various parties interested. We recommend—

'That the resolution of the Council of the 9th of April, 1889, relating to the Bethnal-green Poor's Land, be modified, and that the Charity Commissioners be informed that, in the opinion of the Council, such land (with the exception of a part not exceeding two acres, which may be required for the erection of a parish infirmary) should be handed over to the Council free of cost, to be maintained in perpetuity as an open space.'"

This recommendation met with strong opposition, and was declared to be due to a "snatch vote" obtained in a thinly-attended Committee meeting called during the recess, both the chairman and vice-chairman of the Committee being opposed to the recommendation. Ultimately, the report was referred back to the Committee for further consideration.

Dealing with Surplus Lands.—On the subject of the mode of dealing with the Council's Surplus Lands, the Corporate Property Committee presented the following important report, the adoption of which was moved by Lord Hobhouse, the Chairman of the Committee:—

"We have to report on the following reference, made to us by the Council on April 11, 1889:—

'That the question of the manner of dealing with land which comes into the possession of the London County Council be referred to the Corporate Property Committee for consideration and report.'

1. Land comes into possession of the Council by several different channels and under several kinds of obligations, and in all of these classes except one the powers of the Council to deal with the land are prescribed by law within very narrow limits of discretion.

2. The above reference was made by the Council upon an amendment to a motion made by Mr. W. Saunders in the following terms:—

'That land which shall come into the possession of the London County Council shall not be sold or let on fixed leases; but it may be let on perpetual leases, at rents subject to periodical valuation.'

3. We conceive that both motion and amendment referred only to that land which the Council has to dispose of for the purpose of profit, and so as to recoup as far as may be the expense of its acquisition. In this report therefore we note the fact, but without entering into further details, that the following classes of land come into the possession of the Council with narrowly circumscribed powers of management and disposition:—

I. Land devoted to open spaces.

II. Land acquired under the Artisans' Dwellings Acts, and devoted to the provision of dwellings.

III. Those portions of land acquired under Improvement Acts, which are devoted by the same Acts to the restoration of habitations for the artisan classes displaced by the improvements.

4. The class of land to which we address this report is—

IV. Land which is acquired under Improvement Acts, and which, not being wanted for the intended improvements or devoted by statute to artisans' dwellings, falls into the category of 'superfluous land.'

5. The quantity of superfluous land acquired under Improvement Acts, and now owned by the Council, is about 45 acres, of which about 35 acres are let on leases, at rentals amounting to about 94,000*l.*

6. The obligation imposed by the Lands Clauses Act, 1845, to sell superfluous land within a short time, has been relaxed in the case of the County Council. The periods for which land may be retained unsold are:—

(*a*) As to land acquired under Improvement Acts passed prior to 1881, the year 1929.

(*b*) As to land acquired under the Acts of 1885 and 1886, such period as the Council shall think fit.

(*c*) As to land acquired under the Acts of other years, the year 1941.

7. The modes of dealing with superfluous land allowed by Improvement Acts may be exemplified from the Act of 1888. That Act

gives to the Board of Works discretion to let on building leases not exceeding 99 years, with or without option to the lessees to purchase the fee-simple; to sell the reversions on such leases for reasonable prices; to sell at once for reasonable prices; and to let at rack-rent; but all subject to the obligation to get rid of the whole by February, 1941.

8. The legal modes, then, in which the Council may deal with its superfluous land may be thus enumerated:—

(*z*) By ordinary letting from year to year, or for short terms, at rack-rents. It is obvious that this mode is not applicable to any considerable amount of land, because nearly all that comes to the Council is cleared, and requires building on it in order to be profitable.

(*y*) By the building lease commonly used in London. The usual term granted by the Board of Works has been eighty years.

(*x*) By ordinary sale for a gross sum.

(*w*) By lease with premium. This is obviously not adapted for building land.

9. Another mode would be:—

(*v*) To sell the fee-simple on a fixed perpetual rent, or to grant a term of years tantamount to it (say 1,000 years) also upon a fixed rent.

The latter form of this mode, which is in law a lease, does not fall within the terms of our leasing powers, and it may be doubted whether the first-mentioned form is authorised by our selling powers.

This mode is not used in London. But it is the favourite method of dealing with building land in Manchester and many other large towns in England, and is also in general use in Scotland. Its advantages to the grantee of the land are easy to see; and those who are in favour of enfranchising leaseholds will probably think that it is more for the public advantage than the London system. Whether it is of equal advantage to the grantor is another question; probably it does not yield so much money to him, but it is difficult to tell without seeing the two systems at work side by side in the same locality.

10. We mention last:—

(*u*) The plan propounded by Mr. Saunders. The main principle of this plan is to keep the interests in and the profits of the soil quite distinct from the interests in and the profits of the buildings placed upon it. The landowner is to grant the perpetual use of his land, and to receive at once as much rent as the land without buildings will fetch in the market. The grantee is to build upon the land, but the land is never to become the property of the grantee, nor the buildings the property of the landowner. At frequent periods of time (say every five years) the land is to be revalued, not as it stands with buildings upon it, but as it would be without any buildings, and the rent is to rise or fall with the value of the land estimated on that hypothesis.

We are disposed to think, with Mr. Saunders, that such a plan would reduce the temptation which now exists to put up flimsy buildings, and would put an end to the hardships which are now felt by an occupying lessee, and to the contentions between him and the reversioner which at present are incident to the expiry of a long lease. But it is doubtful whether equal contention between grantor and grantee may not arise from frequent readjustments of rent by valuation; and it is impossible to forecast the other consequences of the principle, as yet wholly untried, of effecting a separation in interest and in ownership between land and the buildings on it, instead of treating them as one entire thing in interest and ownership, which they must necessarily be in use and enjoyment.

Mr. Saunders also claims for his plan that it will diminish the risks of the builder, and so render the trade of building more healthy, and at the same time that it will be more profitable to the landowner. These are conclusions to which we cannot at present see our way.

It is clear that Mr. Saunders' plan is not within our existing powers.

11. It will be observed that there is no legal power for the Council to devote their superfluous land to the purpose of open spaces. It seems reasonable that a body immediately concerned in the maintenance of open spaces should be able to devote to that purpose land which is in its hands, though acquired for another purpose. The power would hardly be used except for small plots of ground. But we conceive that the Council would do well to ask for it on some fitting occasion.

11A. It appears also to be the case that superfluous land acquired under Improvement Acts cannot be applied to artisans' dwellings in the same manner as if it were acquired under the Artisans' Dwellings Act. Again, it seems reasonable that a body charged with the duty of erecting artisans' dwellings should have the power of using for that purpose land which it is under obligation to let or sell, but which it finds to be a proper site for dwellings.

12. With respect to the above modes (*y*) and (*x*) by which the great bulk of property has been dealt with, we have inquired what principle guided the Board in selecting between the two. We are informed that the Board preferred, as a rule, to let on lease, as being the most profitable course; and that they only resorted to sale in cases where they could not effect leases, or where it was inconvenient to hold plots of isolated land, or for some other exceptional reason.

13. We have next considered whether there is any reason for altering the course taken by the Board. If there is, it must rest on one of two grounds: either that more profit can be obtained by some other course, or that it will conduce generally to the advantage of Londoners.

14. As regards the economical ground, the Council are aware that both rent in case of a lease and purchase-money in case of a sale are carried to the Consolidated Loans Fund to meet the debt. But up to the present time new improvements and new loans have demanded much more money than has been either brought in by sales of land, or represented by the acquisition of land. The Comptroller has supplied us with figures which show that during the last ten years the amount of money received from sales, added to the value of the land acquired and retained as the property of the Council, does not exceed one-third of the capital amount expended on improvements. And there are constant demands on us for loans to other Municipal bodies in London.

15. If the question lay between the two alternatives of purchasing our stock at the market price on the one hand, and retaining land to produce rent on the other, it seems clear that the rents would exceed the interest of the stock purchased by selling them, and, though it must always be remembered that the possession of house-property involves charges and liabilities which must be set against the rent, it may be taken that the latter of the two suggested alternatives would be the more lucrative.

16. But so long as we want more money for capital expenditure and loans than can possibly come in by sale of land, there is a third alternative, viz., to sell our land, and to spend the price in the new improvements that are wanted. To work out the probable financial results of such a policy is a matter rather for the Finance Committee than for ourselves; and we have not attempted to solve that problem.

17. Passing from the economical question to that of more general policy, it appears to us that there are two reasons why we should not retain land. One has been already referred to in connexion with the enfranchisement of leaseholds. The property of the Council is, indeed, a very small matter in the mass of London, not equal to one of the larger private estates. Nevertheless, every building-lease that it grants goes to swell the number of leasehold properties, and to diminish the freeholds.

18. The other reason is that, in our judgment, it is not desirable that a Municipal Corporation should, in addition to its other duties and responsibilities, assume the position of an ordinary landowner. It is his interest to deal with his land in the way most profitable to himself, and he has no public or definite duty to the contrary. The Council owe a duty to the ratepayers to make their land profitable, and also have higher duties of control and supervision to perform. It is impossible to suppose that these two sets of duties will not occasionally come into conflict, or that the judgment will not be embarrassed or warped when such a conflict occurs. Moreover, the management of house property, even when let on building lease, requires a considerable amount of detailed supervision which the Council cannot exercise, nor can its individual members. All must be done by paid agency. At every meeting of this Committee, we have before us numerous questions of detail regarding construction, appearance, insurance, lighting, servitudes, and other matters connected with the properties we let on building lease. In such matters, with trifling exceptions, we are dependent on the report of the Architect. It is impossible for us to act with the promptitude or the freedom of an individual owner, and almost impossible to act with as accurate a judgment. At best a certain amount, and not a very small amount, of energy, which had far better be given to public business, is absorbed into dealings with small details of private property. To a certain extent these mischiefs are unavoidable because we must buy and sell. But they are much enhanced by our letting on lease.

19. For the above reasons we are disposed to think that it is desirable for the Council, and therefore for London, that we should exercise powers of leasing more sparingly, and powers of selling more largely; and especially with regard to property acquired in future, or not yet dealt with.

20. It remains to add something with respect to the modes of dealing which we have classed under heads (*v*) and (*u*). We have above intimated that they are beyond our legal powers, but probably the requisite powers could be obtained if the operations were thought desirable. But mode (*v*) is not used in London, and it is not an easy matter to set afloat new modes of dealing with property among people long accustomed to their own modes. Such experiments are sure to be made, at least in the beginning, at the cost of those who try them. The Council is the owner, not of a large or compact tract of land, but of small plots scattered about London. It is not in a position to exert any great influence on the dealings in the London market. It is not so free to try hazardous experiments with the property of the ratepayers as a private owner is with his own property. And, as practical men, we cannot advise that any systematic attempt should be made to deal with the land of the Council according to this mode. At the same time we have been informed that there are practical men who think it likely that London land may be dealt with under head (*v*) advantageously both to grantor and grantee. Our own Architect is disposed to think so. And it may be well to have such a mode open to us, in case favourable offers should be made.

21. As to head (*u*), we have no such evidence. That mode of dealing with land is not only not used in London, but is unknown in England. The obstacles to introducing mode (*v*) apply with increased force to mode (*u*). We think it would be premature to make any move in that direction. But if this plan is really sound and practical, the present discussion will probably make it better known, and bring forward further opinion in its favour.

22. We have thought it our duty to answer the reference fully by exhibiting to the Council all such aspects of the question as have occurred to us. But such recommendations as we have to make lie within a very narrow compass. It does not appear to us desirable that the Council should lay down any rigid rule with respect to leasing or selling. The discretion of the Committee, which means the discretion of the Council itself, should, as we think, be left open in each case. But if the Council approves this report without correction, the result will be that, in the future, more sales will take place in proportion to leases, and the tendency of land in the ownership of the Council to increase will be to some extent checked.

23. The distinct recommendations we make are:—

'I. That the Council should instruct the Committee to sell the land of the Council in preference to leasing it for 99 years, in cases where there does not exist any special reason for leasing it.

II. That the Council should acquire power to keep superfluous land as open space, whenever expedient.

III. That the Council should acquire power to apply to the purposes of artisans' dwellings land acquired under improvement Acts.

IV. That the Council should acquire power to sell land, or demise it for any term of years for a fixed rent.'

No one of these objects can be called urgent. With respect to the application of purchase-money to new improvements, we are not certain whether any fresh legal facilities are required, but if any are, they will be best indicated by the Finance Committee."

Lord Hobhouse having spoken at some length on the general scope of the report, Lord Lingen referred to the general financial bearings of its

proposals, and moved that the report be remitted to the Finance Committee for consideration. This was seconded by Sir John Lubbock, and agreed to *nem. con.*

Proposed Labour Bureau.—Mr. Thornton moved:—"That, recognising the need of a central establishment where masters and men may register their requirements, this Council would be willing, if desired by representative bodies of artisans and labourers, to assist in the establishment of a Labour Bureau." This gave rise to some discussion, and it was ultimately referred to the Contracts Committee to report whether it was possible and desirable to establish such a bureau.

After transacting other business, the Council adjourned.

ARCHITECTURAL SOCIETIES.

Edinburgh Architectural Association.—A lecture on "Some Early Scottish Architects" was given on the 9th inst., by Mr J. Balfour Paul, advocate, to the members of the Edinburgh Architectural Association, in the hall, 42, George-street. Mr. H. J. Blanc occupied the chair. Having pointed out that few records as to the designers of our cathedrals and castles were available, the lecturer proceeded to mention some of the more prominent of Scottish architects of early times. He said (according to the *Scotsman*) that Gilbert of Moray, Bishop of Caithness, in the first part of the thirteenth century had the credit of designing and building at his own charges the church of Durnoch, the remains of which were still in existence, incorporated with the present parish church. The Castle of Kildrummie, in Aberdeenshire, was also probably erected by him. In the fifteenth century a family of the name of Merlyoun was largely employed by the king in executing work at Stirling Castle, Dunbar, and other Royal fortresses. Thomas Cochrane, the favourite of James III., who fell a victim to the vengeance of Angus and other nobles, was stated to have been an architect, though his exact position in the King's household had always been doubtful. Another architect of that century, Sir James Hamilton of Fyvirait, came to a violent end, being executed on a charge of inventing an infernal machine by which the king was to be shot from the tower of Linlithgow. A distinguished man, William Schaw, held the post of king's architect to James VI., and he restored Dumfermline Abbey, and was buried there. After alluding to some of the nobles who were instrumental in erecting the leading mansions and castles of Scotland, the lecturer gave an account of the family of the Mylnes. Belonging to Aberdeen, they gradually came south, and in the seventeenth century John Mylne was located in Edinburgh, and was Member of Parliament for the city. He was buried in Greyfriars' Churchyard. His nephew Robert was the builder of Mylne's Court, and several other premises in Edinburgh. A descendant of his built the North Bridge, and another attained eminence in his profession in London. The lecturer subsequently made reference to the claims put forward for Inigo Jones, Wallace, Aytoun, and Balcasquale as the designers of Heriot's Hospital. He also spoke of Sir William Bruce, of Kinross, who restored Holyrood in 1671. In conclusion, he gave sketches of James Gibbs, Colin Campbell, and the elder Adam. A vote of thanks was passed to Mr. Paul for his lecture.

Glasgow Architectural Association. — The usual monthly meeting was held on the 7th inst., when a paper on "Furniture" was read by Mr. Fred. M. Miller. The chair was occupied by Mr. Wm. James Anderson, vice-president. The paper was well illustrated by examples of old carved cabinet doors and some of Morris's work. A discussion was opened by Mr. Andrew Black, and taken part in by several other members, and at the close a hearty vote of thanks was awarded Mr. Miller.

Manchester Architectural Association.—The members of this Association met on Tuesday evening last at the Diocesan Chambers, when Mr. Lawrence Booth, F.R.I.B.A., a past President of the Association, read a paper on "Commission." The President, Mr. J. H. Woodhouse, was in the chair, and there was a large attendance. The paper dealt with the subject of "Commission" as understood and practised upon in business life, treating it in its several degrees of legitimate, through the questionable, to that of absolute dishonesty; and indicated that many industries were groaning under the effects of the latter, as an incubus preventing their progress and prosperity. In its application to architectural practice the paper deprecated all secret commissions, and advocated complete candour on the part of the architect towards his client, as "suspicion always dogged the steps of secrecy." The author protested against a very general imputation that architects, being paid by commission, brought about extra expenditure in order to increase the amount of their own charges, and asked men of the world to consider for a moment whether any architect, so depraved as to be willing to squander his client's money in order that a shilling in every pound might find its way into his own pocket, would not be likely to devise some more simple and less palpable method of robbing his employer? Extras of a preventible character did make their appearance, and were frequently the result of the desire of architects, especially new beginners, to put in "all they knew in the way of decorative features and good architectural effect," in the hope of enhancing their own professional reputation. Such efforts had frequently the opposite result, and ought to be avoided, but fell very far short of deserving the condemnation bestowed on gross and corrupt motives. The main argument of the paper was directed against the remuneration of architects being regulated by the amount of money spent, or, in other words, against the principle of payment by commission, and in favour of payment by results, the writer saying:—"It is indeed doubtful whether the community would not long since have compelled us to adopt a more rational method in the assessment of our services if they had been less familiar with payment by commission in their other transactions." A cordial vote of thanks to Mr. Booth was proposed by Mr. A. H. Davies-Colley, seconded by Mr. F. W. Mee, and supported by Messrs. Hodgson, Smith, Mould, Chadwick, and the President. This was carried unanimously.

Royal Institute of the Architects of Ireland.—His Excellency the Lord Lieutenant, in replying affirmatively to an address presented to him a few days ago, asking him to become a vice-patron of the Royal Institute of the Architects of Ireland, said:—

"I am very glad to learn from your address that you have such good grounds for being satisfied with the results that have been achieved by your Institute during the last half-century, and I sincerely hope that a similar success may attend your efforts for the further development of your most ancient and important art. But a few days ago it was my privilege to inspect the noble pile of buildings that have recently been erected for the Science and Art Department, and to judge what excellent work Irish architects of the present day can produce. I was specially struck by the beauty of the Irish marble that decorates its walls, for I own I had no idea that this country could produce such varied and splendid specimens, which compare most favourably with Italy's celebrated marbles. I do not doubt that if their excellence were more widely known an important industry might soon be developed, for the public will not fail to show their practical appreciation once they realise the merits of this native product."

Sheffield Society of Architects and Surveyors.—The usual monthly meeting of this Society was held at the School of Art on Tuesday evening last. Mr. F. Fowler, the President, occupied the chair, and there was a fair attendance of members. Mr. J. B. Simpson was elected an Associate of the Society. Mr. J. B. Mitchell-Withers read an interesting paper entitled "Elementary Notes on the Mouldings of Mediæval English Architecture." He quoted the late Mr. Edmund Sharpe's authority for the statement that English architectural history was written as much in the mouldings as in the general outlines and masses of its old buildings. It was an easy matter for the architect who had diligently drawn and measured old work to understand and trace out its development from early to late forms. The nave of Westminster Abbey was a notable instance of the use in one general grand design of the various styles of mouldings from the thirteenth to the sixteenth century. No architect who had not an intimate knowledge of the subject ought to meddle with any old building, the humblest of which was generally a good school to study in, and young architects should diligently study and draw the buildings of their district. The late Sir Gilbert Scott had laid down that measured and full-sized drawings were far more useful to the architect than photographs, &c. The lecturer gave illustrations on the blackboard of the principles of grouping and designing mouldings of the different periods, and alluded to the best means of drawing them from actual work. He also noticed the nomenclature of Mediæval mouldings, quoting from William of Worcester, who wrote at Bristol in the fifteenth century, and the late Mr. E. J. Willson's notes in Pugin's "Specimens." The illustrious French architect, the late M. Viollet-le-Duc, had said that "to the practical architect a knowledge of mouldings was of the first importance," and that the mouldings of the Greeks and thirteenth-century architects "satisfy alike taste and reason." In conclusion, he quoted Professor Ruskin, who, in counselling loving care and reverence in the repairing of ancient buildings, had very beautifully written "that the glory of a building is not in its stones or in its gold. It is in the golden stain of time that we are to look for the real light, colour, and preciousness of its architecture." The lecture was well illustrated by numerous diagrams and measured drawings of the author's, and full-size drawings of the stone details of the south transept of York Minster, lent by Mr. C. Hadfield. On the motion of Mr. E. M. Gibbs, seconded by Mr. C. Hadfield, a hearty vote of thanks was awarded the lecturer.

THE BARBER-SURGEONS' HOLBEIN.

SIR,—In your notice (January 11, p. 24) of the large Holbein picture of King Henry VIII. granting the Charter to the Barber-Surgeons' Company, you remark, "Walpole avers that the picture had been retouched, but its owners say it has undergone no other change than by a careful cleansing in 1719, and again in 1878, by Mr. George Redford."

I think it underwent some change for the better just a quarter of a century ago, when, with the other pictures of the Company, it was entrusted to the care of McLauchlan & Son, then carrying on business at 55, Berners-street.

That it had suffered damage at some period is evident from repainting (chiefly, I think, on the face and hands of the King) in a coarser mode than the rest of the picture. Those who knew the picture before 1865 will remember a very ugly seam from top to bottom, a crack nearly ¼ in. wide, which had been filled with putty and coloured in the roughest way to accommodate somehow the two sides of the gap which should have joined. The oak panel is a remarkable piece of work. It is made of two leaves dowelled together, and the whole front surface has, apparently, been finished with the greatest care, but the back reveals that it is made of hewn boards, the joints (vertical) are very good, but the surface is as irregular as is possible to imagine, the substance varying from about ⅜ in. to 1 in. thick. Some slight horizontal battens had at one time been fixed at the back, with the intention, no doubt, of adding strength, but with the effect of resisting shrinkage, and so causing several cracks to appear, and chiefly the opening of the dowelled joint in the middle. It was not easy to deal with so large a panel (10 ft. 4 in. by 6 ft. 2in.), which is very heavy, and I considered it unadvisable to lay it flat lest the battens should give and other cracks be formed in the surface, so it was kept upright during the treatment it received from me. Stronger battens with bevelled edges were added between the old ones, but not fastened to the panel. Small blocks (nearly 100) having a corresponding bevel were attached to the irregular surface of the panel, securing it to the battens but allowing them to slide horizontally. As the old offending battens were tightly fixed and could not be removed without considerable risk of damage, small pieces were cut out of the middle of each of them. The two leaves were then pushed further apart, the old putty removed, and the joint made true. Through other blocks fixed near the joint coach screws were used to screw the leaves tightly together.

The surface of the picture was revived, but no attempt was made to remove the thick coatings of old varnish.

The long Latin inscription was in parts illegible, and I received instruction to rewrite it, and did so as nearly as possible over the old letters, leaving untouched the initials, which are finished with as much care as in an old manuscript. A gold ground, no doubt, exists to a considerable extent, and from its peculiar treatment must have been very effective in the early aspect of the painting. Besides the inscription, the only colour then used was a little oil-colour rubbed with the finger on the edges of the dowelled joint.

F. H. MCLAUCHLAN.

Competition: Schools in the Isle of Man.—At the last meeting of the Braddan School Board, designs submitted in open competition by Mr. Thomas W. Cubbon, architect, Birkenhead, were unanimously adopted for new school buildings about to be erected at Kewaigne.

Sculpture in Relation to the Age.—This is the title of a course of three lectures to be delivered by Mr. Edwin Roscoe Mullins at the Royal Institution, Albemarle-street, on the following Thursdays, viz., Jan. 23, Jan. 30, and Feb. 6, at 3 p.m. each day.

The Student's Column.

ELECTRICITY, MAGNETISM, AND ELECTRICITY SUPPLY.—III.

MAGNETIC FIELD.

NOT only are lines of force of use in mapping out the contour of fields of force, but they afford graphical methods for solving problems in magnetism that would otherwise present considerable difficulties. The conventions adopted with respect to them, though in some respects similar, differ from those used in ordinary mechanics.

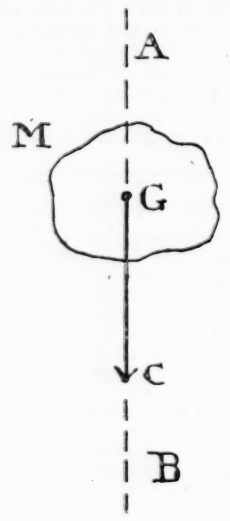


Fig 4.

Suppose M, fig. 4, to be a body near the surface of the earth. Every particle of it is pulled downwards with a certain force, and the lines of force, making up the gravitation field of force in which it is placed, pass vertically through every point in the body to the earth's centre. The effect of the attraction of the earth on such a body is the same as if the whole matter contained by the body were concentrated at a point G, called its centre of gravity. Imagine this done, then one single line of force, A B, will indicate that part of the gravitation field of force which acts on the matter concentrated at G. The line A B shows no more than the direction in which the body tends to move; it does not in any way indicate the magnitude of the force acting at G. If this force is f number of dynes, imagine a portion G C of the line A C, such that G C is f centimetres long, to become visible; then G C denotes not only the line along which the force acts, but also its magnitude. Put an arrow-head at C, and G C will represent completely, in magnitude and direction, the total force due to gravity acting on M, —that is, its "weight."

It should be remembered that the weight of a body varies slightly with its position at the earth's surface, and also with its height above the sea level; but for the limited space through which any body is likely to be moved, G C may be considered constant.

If all magnetic fields, like the earth's gravitation field, consisted of parallel lines of force, the same means could be adopted for the purpose of completely showing the forces acting on any magnet or system of magnets; it happens, however, that magnetic fields are frequently very curiously shaped, and not only so, but the actual force acting on a pole of any given strength may vary enormously though it change its position very slightly. The force which acts on a pole depends upon the "strength of the field" at that point; *the strength of a magnetic field* at any point is measured by the force which unit magnetic pole would experience if placed at that point. The strength of a field at any point being F, a pole of strength m placed there will be acted on by a force of $m\ F$ dynes.

A graphical method, which will not only show the contour of a field but also its *strength* at any point, will enable us to tell both the magnitude and direction of the force acting on a pole, of known strength, placed anywhere in the field.

Take a simple case where the opposite poles of two magnets face each other, as in fig. 5; in the arrangement under consideration, let it be desired to represent graphically the shape and strength or intensity of the portion of the whole field included within the dotted circle A B C.

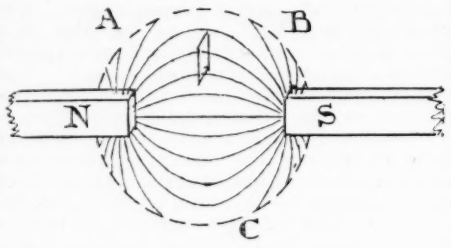


Fig 5.

A magnetic pole will experience some force if placed anywhere within A B C, no matter how weak or strong the poles N and S may be, hence the area selected must be full of lines of force. But by supposing only a certain number of lines to become visible, the number being made greater the stronger the field, such a picture will also indicate the strength of the field. This is done by drawing so many of the lines that if at any point in the field, where the strength is F, a little surface of area a square centimetres is put at right-angles to the lines of force, then n the number of visible lines of force passing through it shall be $a\ F$, so that since $n = a\ F$, $F = \frac{n}{a}$ in words—the number of [visible] lines of force per square centimetre of the surface is equal to the strength of the field at that point.

When lines of force are referred to, the word "visible" will be understood, but that the lines of force meant are not all the lines of force must not be forgotten, otherwise a magnetic pole could be placed *between* the lines of force in the figure where it would not be acted on by any force. This we know to be contrary to fact.

To those unaccustomed to graphical methods, this way of representing a magnetic field may seem artificial and unnecessarily complicated; but a few experiments, made by shaking iron-filings from a muslin bag on to a card placed over a single magnet or any arrangement of magnets, and then tapping it slightly, so as to enable the filings more readily to take up their required positions, will soon make lines of force seem a reality to the student, and enable him to easily picture to himself the directions of the force, actually producing the effects of magnetism in the medium around a magnet.

Drawing only a certain number of the lines of force is indeed artificial, but it renders easy the solution of many problems that would otherwise require analytical treatment.

CURRENT.

The properties of electricity are so modified by the presence of matter that the older theories only recognised its existence in or upon matter.

Certain substances, pre-eminently the metals, appear to act like lubricants of electricity; the friction, or whatever it may be, which gears the particles of electricity together in space, being so reduced as to allow the free movement of the electricity, contained by these so-called *conductors of electricity*, within them. A perfect conductor, if such a thing could exist, would be a body which reduced this friction to zero; a perfect *non-conductor*, *insulator*, or *di-electric* is a body in which this electrical friction is infinitely great. Paradoxical as it may seem, pure electricity appears to be a perfect insulator, as space shows no evidence of possessing any conducting power at all. Conductor and insulator, as commonly used, are merely relative terms; it is a matter of opinion when a substance is so bad a conductor as to be called a bad insulator, or *vice versâ*.

Electricity travelling through a conductor is called an *electric current*.

In all conductors an electric current experiences a force obstructing its flow; this obstructing force is not a constant one, but varies directly with the current, or the quantity of electricity passing any section of the wire or other conductor per second. Now, since there is every reason for believing that electricity is incompressible, if the current is doubled the speed with which the electricity flows past any point must be doubled, and it is found experimentally that double the driving force is required to meet the increased obstruction. This opposing force, then, in the conductor acts like the friction which opposes the flow of liquids. The obstruction which is offered by a conductor to the flow of electricity is called its "electrical resistance"; and electrical resistance and liquid friction produce analogous effects. When anything is moved against the force of friction, which must necessarily be a force opposing the movement, heat is produced; here again the analogy holds, for an electric current generates heat and raises the temperature of any conductor through which it flows.

As electricity can move in a conductor, if the pressures or potentials at two points are different, a flow takes place until equality of potential throughout the mass is established. Any piece of apparatus, such as a voltaic cell, which is capable of maintaining a current, does so by pumping electricity into a conductor at one end, and pumping it out at the other before equality of potential can be established. Difference of pressure, or whatever causes electricity to flow along a conductor, or try to flow along an insulator, is called *electro-motive force*, frequently written E.M.F.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

18,144, Draining Land. J. H. Rimell and T. Clements.

According to this invention, a plough or tool with cutters is made for use by horse or steam power. In the channel cut by the first of the cutters, a second tool which makes an enlargement of the channel, and a third, smoothing, finishing, or sleeking tool, are caused to make a smooth plain channel for drainage.

355, Machinery for Working Stone. F. Trier.

By this inventor, many mechanical details are introduced to the ordinary make of machines and tool-holders. The axis of the cutter-spindle is set at an angle to that of the cutter-bush, so that by turning the latter in the socket it produces an effect called step-cutting. Internal and external angles may be cut with the one cutter, the trunnion being so mounted as to allow the cutter to act in two angles alternately. Arrising cutters and grindstone dressers are also provided by suitable mechanical devices, and connexion of the several parts of the machines.

2,539, Ventilating Apparatus. D. Pennefather.

According to this invention, air is drawn in by heating the pipes in which it is to be conveyed, sometimes by means of the jets employed to light the room; the products of combustion are led away outside the room, or space in which the flame is burning, by a pipe arranged so that it is heated by the gas or the products of the combustion from the gas used in lighting. In lamps of the regenerative type, suitable pipes are fitted from them to effect the thorough ventilation of the apartment.

3,041, Chimney-tops. J. Armitage.

With a view to prevent down-draught, in the periphery of the chimney-top are formed four vertical openings arranged opposite to each other. Each opening, or aperture is covered by a suitable door, which is hinged or pivotted to the framing or casing of the chimney-top, so as to open outwards, and the doors are connected together in pairs by a suitable bar, so that when one door is closed by the air currents the opposite one will be opened for the exit of smoke or other gases. But should the air-current change or veer to the opposite side of the chimney-top, the door on that side will, by the pressure of the current, be instantly closed, also automatically opening the opposite one.

4,220, Sewer and House-drain Traps. W. Smith.

According to this invention, a jet of water is directed by a pipe from an overhead cistern to the bottom of a trap for the purpose of cleaning out any sediment or dirty water.

17,848, Folding Ventilators. F. H. Wilks.

This appliance is principally designed for ships, to conduct fresh air through the air ports. The top part of the ventilator is made of bent pieces of spring steel or sheet metal. They fold down, lapping one over the other; but when in use they are raised by means of a chain to a hood, from which the air is conducted by pipes to cabins or berths. The invention is also applicable to all classes of hooded ventilating cowls.

NEW APPLICATIONS FOR PATENTS.

Dec. 23.—20,604, C. Waddington and H. Butterfield, Drain-pipes, &c.—20,609, T. Kendrick, Bolt for Fixing Doors in any position.—20,612, J. Kaye, Temporarily Securing Doors, &c.—20,681, A. Myall, Composition for Finishing Wood Mouldings, &c.

Dec. 24.—20,691, R. Little, Warming Buildings.—20,692, J. Coulter, Machines for Dressing Stones.—20,707, R. Mullard, Paints, Varnishes, &c.—20,712, B. White and J. Boyd, Brick-making Machines.

Dec. 27.—20,786, R. Hirst, Opening, Closing, and Fastening Counter-flaps and Doors with one action.

Dec. 28.—20,814, J. Tudberry, Drying Bricks.—20,833, W. May and A. Padmore, Window-fasteners.—20,843, F. Parker, Hinges.—20,848, A. Smith,

Artificial Stone.—20,849, M. Cahn, Device for Removing Broken Screws, &c.

Dec. 31.—20,914, A. Klapperstuck and A. Meyer, Fireproof Ceilings and Walls.—20,957, R. Haddan, Water-closets.—20,976, H. Johns, Roofing Sheets and Fabric.—20,993, S. Taylor and W. Miller, Sash Pulleys, &c.

Jan. 2.—65, E. Hesketh and A. Marcet, Cooling the Air in Rooms, &c.—85, W. Beale, Paving Streets.—87, D. Hart, Screw-drivers.

Jan. 3.—97, M. Walker, Ventilators.—137, J. Lyon, Building and Glazing Greenhouses, &c.

Jan. 4.—162, M. Adams, Construction of Fireplaces.

PROVISIONAL SPECIFICATIONS ACCEPTED.

19,724, H. Aland, Rotary Fans for Producing Currents of Air.—19,854, E. Jessurun, Screw-drivers.—20,148, C. Thompson, Fire Grates or Stoves.—18,076, H. Lake, White Lead.—19,246, J. Wilson, Hearths, &c.—19,260, C. Carmont, Treads for Floors, &c.—19,308. D. Grant and others, Water-closets.—19,399, J. Scholes, Draught-excluders for Doors.—19,483, J. Robbins, Disinfectants for Sewers, &c.—19,575, S. Burgess, Sash. Windows.—19,616, M. Wardle, Hanging Window-sashes.—19,657, W. Davies, Flushing Apparatus.—19,664, W. Scott-Moncrieff, Urinals.—19,699. W. Cook, Baker's Ovens.—20,107, W. Akerman, Brick Kilns, &c.—20,240, A. Linford and others, Sash-fasteners.—20,254, S. & S. Eaton, Chandeliers.—18,834, J. Wilkinson, Window-fastener.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

1,262, A. McLean, Artificial Stone.—3,354. A. Ponton and others, Blocks or Bricks, composed of siliceous materials.—3,563, H. Lord, Water-closets.—13,765, J. Tall, Construction of Doors, &c.—15,825, C. Earl, Outside Shop-fittings.—18,846, F. Phillips, Mortising Machines.—3,254, E. Showell, Bolts or Fasteners.—3,580, F. Berry, Electric Bell or Gong.—4,347, J. Homan, Fireproof Structures.—4,486, W. Prideaux, Screws.—10,070, J. Atherton, Door-handles.—10,997, J. King, Treatment of Walls.—13,764, J. Tall, Sash-frames, &c.—17,640, W. Thompson, Artificial Stone.—19,942, E. Winchester, Door-latches.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

JAN. 9.—By H. S. HAWLEY & CO.

Walthamstow—8, The Pavement, at 86 yrs., g.r. £3. 10s., r. 50 p.a.	£550
Stockwell—F.g r. of £86 p.a., with reversion in 70 yrs.	2,220
F.g.r. of £1 p.a., with reversion in 70 yrs. to e. r. of £240	200

By J. ROSS.

Clerkenwell, Great Bath-st.—F.g.r. of £130, reversion in 23 yrs.	2,780

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

New Public Building at Eton.—The *Daily Telegraph* informs its readers that "a handsomely-designed building, in the Tudor style of architecture," is being erected by the Bridge Trust at Eton. The edifice, which is of red brick and Bath stone, occupies a prominent site in the High-street on the south-west side of Barnes Pool, and will contain offices for the Trust and the Local Board of Health. The architect is Mr. Robert Aborn, of Eton, and Messrs. Goddard are the builders. The Bridge Trust, from whose funds the cost of the building will be defrayed, originated in the time of Edward I., when a local benefactor left a quantity of land for the construction and maintenance of a bridge connecting the college and town at Barnes Pool. From a few pounds yearly the annual income derivable from the testator's property has increased to about 350*l.*, and has enabled the Trust, with some extraneous aid, to expend 3,000*l.* on the erection of the present fine girder bridge between Eton and the school, and the new offices in the High-street.

Engineering Works on the Elbe.—The City of Hamburg is on the point of laying out a sum of 150,000*l.* in widening, deepening, and otherwise regulating the course of the river Elbe below that city, a plan long contemplated. The Prussian State will also contribute a similar sum upon the work. A plan is also under consideration for the carrying out of similar works on the Upper Elbe, between Magdeburg and Hamburg, which would be of great importance to central Germany.

Museum of Art at Bergen.—A museum of art and industry,—the first of its kind,—has just been opened at Bergen in Norway.

MEETINGS.

MONDAY, JANUARY 20.

Royal Institute of British Architects.—The President (Mr. Alfred Waterhouse, R.A.) will deliver an Address to Students, and will present the several Studentships, Medals, and other Prizes for the year 1889-90. 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Silvanus P. Thompson, D.Sc., on "The Electromagnet." I. 8 p.m.

Leeds and Yorkshire Architectural Society.—Mr. E. W. Mountford on "Public Libraries." 7.30 p.m.

TUESDAY, JANUARY 14.

Institution of Civil Engineers.—Further discussion on Mr. G. F. Lyster's paper on "Recent Dock Extensions at Liverpool." 8 p.m.

Glasgow Architectural Association.—Mr. A. Roche on "Decoration."

WEDNESDAY, JANUARY 22.

Society of Arts.—Mr. R. B. Carter on "Vision-Testing for Practical Purposes." 8 p.m.

THURSDAY, JANUARY 23.

Royal Institution.—Mr. E. Roscoe Mullins on "Sculpture in Relation to the Age." I. 3 p.m.

Institution of Electrical Engineers.—Adjourned discussion on the President's address on "Magnetism." 8 p.m.

Edinburgh Architectural Association.—Rev. Edward Sugden on "Symbolism." 8 p.m.

FRIDAY, JANUARY 24.

Royal Institution.—Professor Dewar, M.A., F.R.S., on "The Scientific Work of Joule." 9 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. T. H. Chapman on "The Up-Keep of Metalled Roads in Ceylon." 7.30 p.m.

SATURDAY, JANUARY 25.

Glasgow Architectural Association.—Visit to the Prudential Insurance Company's new office, Renfield-street.

Miscellanea.

Registration of Plumbers.—The Mayor of Hull, Dr. Sherburn, presided a few days since at a public meeting held in the Town-hall, Hull, for the distribution of Certificates of Registration granted by the Plumbers' Company, London, to plumbers in the Hull district. There was a large attendance of members of the plumbing trade.—The Mayor, in opening the proceedings, said the work which the Plumbers' Company was carrying on deserved the very highest praise from every citizen, not only in Hull, but throughout the entire country.—Alderman Fraser said the Corporation Sanitary Committee, of which he had the honour to be the chairman, was anxiously desirous of working hand in hand with the plumbers in their efforts to raise the educational status and increase the efficiency of their craft, in the common interest of its members and the public.—Mr. Ferguson, A.R.I.B.A., said he made it a practice to separate the plumbers' work from all other work in his building contracts, and he strongly recommended architects in general to do likewise.—Mr. Councillor Cohen remarked that he believed the effect of the registration system would be to give the public confidence in plumbers, as a body of tradesmen competent in sanitary matters.—Dr. Mason, Medical Officer, supported the remarks of Mr. Councillor Cohen, adding an expression of his opinion that the registration system would be the means of gradually weeding out the incompetent workmen, and thereby, in a great measure, insuring the public against the evil effects of defective plumbers' work.—Several other speakers having addressed the meeting, Certificates of Registration were distributed to a number of master and operative plumbers, and the proceedings terminated with a vote of thanks to the Mayor.——A requisition, signed by the Mayor of Plymouth and a number of representatives of the plumbing trade and the public, has just been received by the Plumbers' Company, desiring that a centre should be formed at Plymouth for carrying out, in South Devon, the Company's national system for the technical education and registration of qualified plumbers.

Death of Mr. Daniel Adamson, C.E.—We regret to see the announcement of the death of Mr. Daniel Adamson, who was the leading promoter of the Manchester Ship Canal scheme during its Parliamentary struggles in the years 1883–85. As chief of the firm of Messrs. D. Adamson & Co., Hyde-junction, he was largely concerned in the introduction of Bessemer steel. He was President of the Iron and Steel Institute in 1887, and was a distinguished member of other mechanical and scientific associations. Born at Shildon, in the county of Durham, in 1818, he was 71 years of age at his decease, which took place at Didsbury on Monday last, after about a year's illness. His early engineering experience was gained in superintendence of the works of the Stockton and Darlington Railway. He was afterwards manager of the Shildon Engine Works.

Royal Meteorological Society.—The annual meeting of this society was held on Wednesday evening last, at the Institution of Civil Engineers, Dr. W. Marcet, F.R.S., President, in the chair. The Council, in their report, congratulated the Fellows on the generally prosperous state of the Society; the past year's work, though not in any respect exceptional, having been thoroughly successful. The total number of Fellows is 550, being an increase of twenty-five on the previous year; the finances are improving, and the library is overflowing. Mr. Baldwin Latham, M. Inst. C.E., was elected President for the ensuing year. The retiring President, Dr. Marcet, then delivered an address on "Atmospheric Dust," which he divided into organic or combustible, and mineral or incombustible. The dust scattered everywhere in the atmosphere, and which is lighted up in a sunbeam or a ray from an electric-lamp, is of an organic nature. It is seen to consist of countless motes,—rising, falling, or gyrating, although it is impossible to follow any of them with the eye for longer than a fraction of a second. It is difficult to say how much of the dust present in the air may become a source of disease, and how much is innocuous. Many of the motes belong to the class of micro-organisms which are frequently the means of spreading infectious diseases. Many trades, owing to their dusty nature, are very unhealthy. Dust, when mixed with air, is inflammable, and liable to explode. After giving several instances of explosions due to fine dust in flour mills and coal mines, Dr. Marcet referred to inorganic or mineral dust, and gave an account of dust-storms and dust-pillars in India. He then proceeded to describe volcanic dust, which consists mainly of powdered vitrified substances, produced by the action of intense heat. The so-called ashes or scoriæ shot out in a volcanic eruption are mostly pounded pumice, but they also originate from stones and fragments of rocks, which, striking against each other, are reduced into powder or dust. Volcanic dust has a whitish grey colour, and is sometimes nearly quite white. Dr. Marcet concluded with an account of the great eruption of Krakatoa, in August, 1883. The address was illustrated by a number of lantern slides.

Election of City Engineer of Liverpool. The *Liverpool Post* announces that a special meeting of the Liverpool City Council was held on Wednesday at the Town-hall, the Mayor presiding, for the purpose of considering the recommendation of the Health Committee that Mr. Henry Percy Boulnois, Borough Engineer of Portsmouth, be appointed City Engineer, in the room of Mr. Clement Dunscombe, at a salary of 850*l.*, with an annual increase of 50*l.* till it reached 1,000*l.* Mr. E. H. Cookson, in moving the adoption of the Health Committee's recommendation, read a letter from Sir Frederick Bramwell, in which he said that having had frequent opportunities of observing the mode in which Mr. Boulnois had carried on his work at Portsmouth, he had much pleasure in recommending him to the Corporation of Liverpool. Mr. Cookson said Mr. Boulnois had had an extensive experience. The Health Committee had selected him out of forty-two candidates, and had eventually been unanimous in recommending him. Mr. John Houlding seconded the motion, which was passed without a dissentient. The Corporation of Liverpool are to be congratulated, we think, on what strikes us as a very good appointment.

The English Iron Trade.—Mainly owing to gambling in Scotch warrants, the regular course of business in the iron trade was somewhat interfered with last week, but the market once more emerges from the ordeal in a steady condition, a sign that trade generally is still in as healthy a state as it entered the new year in. Pig-iron has been depressed by the operations in Scotch warrants; but although the latter have experienced a considerable drop, prices of Scotch makers' iron, for which there is a fair demand, have remained steady. Middlesbrough pig has lost 3s. 6d. a ton since last week, but hematites in the north-west remain unchanged with makers, and in other districts the value of pig-iron is fairly well maintained. In finished iron business is pretty active, and rates are steady, the result of the quarterly meetings being to confirm the stability of prices. Steel is slightly quieter, but there is no going back from recent advances. Shipbuilders are busy, but no fresh orders are reported this week. Engineers are briskly engaged, with plenty of fresh work offering.—*Iron.*

The Proposed Fine-Art Galleries and Museum for Glasgow.—Some time since we referred to a report prepared by Mr. Carrick, Master of Works, for the restoration of the West-End Park after the removal of the Exhibition buildings, and providing also a site for the proposed Fine-Art Galleries and Museum. In this report Mr. Carrick suggested that the area of the park to the east of Radnor-street should be appropriated for the site in question, and that the portions fronting Sandyford-street and the Park should be set apart for dwelling-houses. This scheme, it was calculated, would have resulted in the realisation of fully 24,000*l.* from the feuing ground, exclusive of the value of the area reserved for the museum and art galleries. About three months ago this report was deliberated upon by the committee entrusted with the matter, and various suggestions were made which the Master of Works was asked to consider and to embody in an amended report. This has now been prepared, and we believe that it differs materially from the former one. The feuing proposal has been entirely given up, while the site of the proposed Art Galleries and Museum has been carried westward, as we are informed, to the ground occupied by the machinery section of the late Exhibition. The site extends to 10,000 square yards, carrying a structure 450 ft. in length by 200 ft. in width. Although different in form from that of the earlier plan, the space for the various art departments is vitually unchanged. The proposal is to have a grand central hall, surrounded by corridors, and entered from Sandyford-street and the Park. On the western side will be placed a museum of science and art, with public galleries for housing the collection under the management of the Corporation. Then follow a suite of *salons* adapted for the exhibition of pictures and sculpture, and an institution of fine art, including the School of Design and Haldane's Academy. The whole accommodation may be placed *en suite* when required, and the scheme of the plan admits of the structure forming the central part of any group of Exhibition buildings that may be projected in the future.—*Glasgow Herald.*

Society of Biblical Archæology.—The Report of the Secretary (Mr. W. Harry Rylands) for the year 1889 contains the following passages:—"During the past year the Society has suffered severe loss by the death of some of its members, and it is with no ordinary pain that I have to record the names of the Right Rev. J. B. Lightfoot, D.D., &c., Bishop of Durham, Vice-President, and Professor William Wright, D.C.L., LL.D., &c., both of whom from its commencement took the warmest interest in the Society. To Professor Wright we have been often indebted for valuable papers and notes. In vol. ix. of the Proceedings, he commenced a description of the Kufic gravestones in the British Museum, and being asked, with his usual kindness, willingly undertook to place the members in possession of descriptions and translations of these ancient and curious memorials of those who lived and died 800 to 1,000 years or more ago. Commenced in June, 1887, a melancholy interest is attached to his second and last communication, which appeared in our Proceedings of June, 1888. Another distinguished member has passed from us, Philip Henry Gosse, F.R.S., well known from his many valuable works on natural history. Although his favourite line of study was foreign to the objects of the Society, his interest in our subjects was very great, and as one of our earliest members, he ever gave the assistance and support in his power, which was continued to the last. It is true our loss has been great, but I am pleased to be able to state that the number on the roll of members, although the increase is not so extensive as might be wished for the welfare of the Society and advantage of present and future members alike, is fairly maintained."

The London Sewage Question. — The adjourned discussion upon Sir Robert Rawlinson's paper on this subject (see last volume of the *Builder*, pp. 444, 457) was continued and concluded at the meeting of the Society of Arts on Wednesday evening last. We hold over our report until next week.

Royal Institution.—The evening meetings will begin on Friday, January 24, at nine o'clock, when Professor Dewar, F.R.S., will give a discourse on the Scientific Work of Joule.

The Clerks of Works' Association.—We hear that the annual dinner of this Association takes place on Feb. 10, Mr. J. Macvicar Anderson, V.P.R.I.B.A., in the chair.

Newspaper Offices, Sydney, N.S.W.—New offices have lately been completed for the Sydney *Daily Telegraph*. They have been erected by Messrs. Harrison & Sons, from designs by Messrs. Mansfield Brothers, to the order of *The Daily Telegraph* Company. The block consists of four floors and a basement let into the solid rock which forms the foundation, and from the footpath to the top central figure of the parapet the height is 71 ft. Our Sydney contemporary thus describes the architectural character of its new building:—"Commencing at the ground-floor, two substantial Doric columns are observed, with rusticated piers on either side to correspond. Two doors give access to the building,—the one on the left leading direct to the stairs communicating with the literary department, and the one on the right admitting to the commercial section of the establishment, where advertisements are received and all the financial business of the company is transacted. Over the doors are moulded archivolts with carved keystones in high relief, and the window is treated in the same way. Above the columns of the ground-floor come the moulded cornice, frieze and architrave, all agreeing harmoniously with the Doric columns and piers, and the enrichments generally. Here, in raised gun-metal, appear the words '*The Daily Telegraph.*' From the first-floor to the third the front is embellished with fluted columns and pilasters of the Corinthian order. These columns and pilasters are monoliths, and such very fine stones were not easily obtainable. The windows in between are treated with moulded and carved caps and moulded imposts, keystones and archivolts, the windows of the first and second floors being divided by moulded bands with Grecian key enrichments. The handsome pilasters and columns are surmounted by Corinthian entablature, with cornice embellished by carved modillions, dentils, and carved panels *en soffite*. Then next in order are the frieze and moulded architraves, in strict keeping with the surroundings. The central portion of the cornice is emphasised by a pediment, with similar ornamentation to that of the cornice, and finished off with carved terminals. On the fourth and last story the pilasters of the Doric order supersede the Corinthian, which enrich the central portion of the front. These Doric pilasters have fluted shafts and moulded caps and bases, surmounted by a moulded cornice with segmental pediment, harmonising with the decorative portions below. The windows are treated with moulded caps and bases, but the central one is varied. This window is brought into prominence by a carved panel in spandrel, moulded architrave, and moulded keystone. Over the top story is a balustrade with moulded base and capping, and with piers and terminals on either side. The central feature of the parapet is raised above the balustrade with moulded cornice, carved terminals and moulded and carved consoles, and thus makes the central portion of the front in keeping with the general treatment of the elevation. The whole of the front is in best quality of rich brown-coloured Pyrmont freestone, unrelieved by other stone, and is handsome without being 'loud.'"

A Gift to Leicester by Mr. G. F. Watts, R.A.—In accordance with a promise made some time ago, Mr. G. F. Watts, R.A., has presented to the Leicester Art Gallery his picture, "Orlando pursuing the Fata Morgana," the subject of which is taken from the Italian poet Bogardo. The picture has been on view at Birmingham, and is to be sent to Leicester very shortly. In the letter announcing the gift Mr. Watts says:—"My reasons for presenting it are desire to help in forming the collection of pictures which I believe the town contemplates making, as I am confident art is a great humanising factor, and I greatly desire to lend what aid I may in aid of general progress. On this occasion I give one of my best pictures in recognition of the services your townsman, Mr. John M. Cook, is rendering, especially in Egypt, to the nation, making its name respected by admirable administration and honourable dealing."

Swedish Glass-painting Industry.—An industry hitherto foreign to Sweden has been that of manufacturing painted glass for architectural decoration, such work having been imported from Germany. Now, however, Herr R. Callander, a well-known Swedish painter, has opened an establishment at Gothenburg for the production of stained glass, which is being well supported by Swedish architects.

New Stock Exchange, Edinburgh.—Hitherto the Edinburgh Stock Exchange has been accommodated in premises held on lease, but a new building for its accommodation has been erected, from designs by Mr. John MacLachlan. The site is at the angle of North St. David-street and Thistle-street, in the immediate vicinity of St. Andrew-square. Mr. MacLachlan has treated the building in a free Classic style. The façade is richly decorated with carving, which has been executed by Mr. John Rhind. Besides the foliated detail, there is a large panel with a figure representative of Commerce, and medallions of female figures emblematical of the four quarters of the globe. The entrance, at the base of an angle tower, opens upon a vestibule giving access to an inner hall, both of which have high dados of Burmantofts faïence. The hall in which the business of the Exchange is conducted is a lofty apartment, 46 ft. by 36 ft., lined to the cornice with oak, having large windows filled with tinted opalescent glass and flanked by oak pilasters. The hall is pronounced to be, in every respect, well suited for its purpose. The basement under the hall is occupied as the telegraph department, and in the remainder of the basement are lavatories, heating apparatus, &c. The secretary occupies rooms in an entresol; on the first-floor are the clearing-house and committee-rooms, and on the top flat there is a smoking-room and a care-taker's house. To provide for further extension, should such be required, the adjoining building, to the north, has been secured, and the existing premises are so designed that any addition made to them may add to the general effect. The entire cost of the building, including both sites, is about 25,000*l.*

The Norwegian Stone Industry, 1889. The Norwegian stone industry last year was not so profitable as in the year before, prices being lower and the demand smaller. This was particularly the case in London,—otherwise the best market,—whither less granite was shipped than in 1888. The export amounted to 30,000 tons in 1889, as against 36,000 tons in 1888. However, the demand and prices for paving-stone were good.

The Nicaragua Canal. — Advices from Nicaragua state that the work upon the canal is progressing satisfactorily, and is being carried on with great vigour. The Nicaraguan Government has decided upon forming a large town and constructing a fine harbour at the Atlantic end of the canal, to which end engineers have been dispatched thither. It is to be called "America."

The North-Sea-Baltic Canal.—In order that the work on the North-Sea-Baltic Canal may not be retarded, operations are now being carried on on several sections after dark by the aid of the electric light.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	7	0	0	7	15	0
Teak, E.I. ....load	12	0	0	14	0	0
Sequoia, U.S. ....foot cube	0	2	3	0	3	0
Ash, Canada ....load	3	0	0	4	5	0
Birch ,, ...	3	0	0	4	15	0
Elm ,, ...	3	10	0	4	15	0
Fir, Dantsic, &c.	2	0	0	3	10	0
Oak ,, ...	2	10	0	4	10	0
Canada	5	10	0	7	0	0
Pine, Canada red	2	10	0	3	10	0
,, yellow	3	0	0	5	5	0
Lath, Dantsic ....fathom	4	10	0	5	10	0
St. Petersburg	5	0	0	6	10	0
Wainscot, Riga, &c. ....log	0	0	0	0	0	0
Deals, Finland, 2nd and 1st. std.						
100	8	10	0	11	0	0
,, ,, 4th and 3rd	7	0	0	8	0	0
Deals—Riga	7	0	0	9	0	0
St. Petersburg, 1st yellow	11	0	0	14	0	0
,, 2nd ,, ...	9	0	0	10	10	0
,, white	6	10	0	10	0	0
Swedish	7	10	0	16	0	0
White Sea	9	0	0	17	0	0
Canada, Pine, 1st	16	0	0	26	0	0
,, ,, 2nd	11	0	0	17	10	0
,, ,, 3rd, &c.	8	0	0	10	10	0
,, Spruce, 1st	9	0	0	11	0	0
,, ,, 3rd and 2nd ..	7	0	0	9	0	0
New Brunswick, &c.	6	0	0	8	10	0
Battens, all kinds	6	0	0	17	0	0
Flooring Boards, sq., 1 in., prepared, First	0	11	0	0	14	0
Second	0	8	0	0	10	6
Other qualities	0	6	0	0	7	9
Cedar, Cuba ....foot	0	0	4	0	0	5
Honduras, &c.	0	0	4	0	0	4½
Mahogany, Cuba	0	0	5	0	0	6½
St. Domingo, cargo average ..	0	0	5	0	0	6½
Mexican, cargo average	0	0	4½	0	0	5½
Tobasco ,, ...	0	0	5½	0	0	6½
Honduras ,, ...	0	0	5½	0	0	6½
Box, Turkey ....ton	4	0	0	13	0	0
Rose, Rio	15	0	0	20	0	0
Bahia	14	0	0	18	0	0

TIMBER *(continued)*.	£.	s.	d.	£.	s.	d.
Satin, St. Domingo.....foot	0	0	9	0	1	3
Porto Rico	0	0	10	0	1	6
Walnut, Italian	0	0	4½	0	0	6½
METALS.						
IRON—						
Bar, Welsh, in London ....ton	7	15	0	8	5	0
,, ,, at works in Wales	7	5	0	7	15	0
,, Staffordshire, in London..	8	10	0	9	10	0
COPPER—British, cake and ingot	57	0	0	58	0	0
Best selected	59	0	0	60	0	0
Sheets, strong	66	0	0	0	0	0
Chili, bars	50	10	0	0	0	0
YELLOW METAL.....lb.	0	0	5¾	0	0	6
LEAD—Pig, Spanish .....ton	13	17	6	0	0	0
English, com. brands	13	17	6	14	0	0
Sheet, English	16	10	0	16	10	6
Pipe.....	17	0	0	0	0	0

METALS *(continued)*.	£.	s.	d.	£.	s.	d.
TIN—Straits	94	10	0	0	0	0
Australian.....	95	0	0	0	0	0
English Ingots.....	99	10	0	0	0	0
OILS.						
Linseed .....ton	20	12	6	20	17	6
Cocoanut, Cochin	26	10	0	0	0	0
Ceylon	23	15	0	0	0	0
Palm, Lagos	25	10	0	0	0	0
Rapeseed, English pale	32	15	0	0	0	0
,, brown	31	0	0	31	5	0
Cottonseed, refined	22	0	0	22	5	0
Tallow and Oleine	21	0	0	40	0	0
Lubricating, U.S.	5	10	0	6	10	0
,, refined	7	0	0	12	0	0
TAR—Stockholm.....barrel	1	6	6	0	0	0
Archangel.....	0	17	6	0	0	0

COMPETITION, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITION.

Nature of Work.	By whom Required.	Premium.	Designs to be delivered.	Page
Market House and Public Offices	Gainsboro' Local Board	26*l.* 5s. and 5*l.* ...	Mar. 7th	ii.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Kerbing, Tarpaving, Metalling, &c., Works	Lewisham Bd. of Wks.	*Official*	Jan. 21st	ii.
Sewering, Paving, and making-up Roads, &c.	Cheshunt Local Board	T. Bennett.....	Jan. 22nd	ii.
School Buildings, Fencing in Site, and Land Drainage and Making Roadway	Clayton and Keymer School Board	E. J. Hamilton.....	do.	ii.
York Paving.....	Mile-end Vestry	J. M. Knight.....	do.	x.
Pulling Down Old Prison, Clerkenwell	School Bd. for London	*Official*	Jan. 24th	x.
Repairs to Water Vans and Carts	St. Pancras Vestry	W. B. Scott	Jan. 27th	x.
Sewage Works	Compton Gifford L. B.	Jas. Mansergh	do.	ii.
New Roof and Repairs to Schools, Edmonton	Strand Union	W. S. Cross	Jan. 28th	x.
Road Materials and Oil	Bexley L. B.	E. Reeve Boulter.....	Jan. 29th	ii.
Works and Materials.....	Chelsea Vestry	T. W. E. Higgens	Jan. 30th	ii.
Engine and Boiler Houses, Chimney Stack, &c.	Staffs. Potteries Waterworks Co.	G. D. Harrison	do.	x.
Postal Sorting Office, Clapton.....	Com. of H. M. Works...	*Official*	Jan. 31st	x.
Street Cleansing, Watering, and Removal of Dust.....	St. Margaret, &c. (Westminster) Vestry	G. R. W. Wheeler	Feb. 5th	ii.
Re-building Enclosure Wall, Chapel, Holloway-road	St. Mary, Islington, Churchwardens	Wm. Smith	Not stated.	ii.
Iron Enclosure Fence	ditto	ditto	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of Works.....	York Corporation	2*l.* 10s. per week ...	Jan. 25th	xvi.
Surveyor	Stroud Local Board ...	150*l.*	Jan. 30th	xvi.
Roads Foreman	Abergavenny Impt. Com.	Not stated	Jan. 30th	xvi.
Road Surveyors	Norfolk Highway Com.	2*l.* per week each ...	Feb. 1st	xvi.

TENDER S.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

AUDENSHAW. — For sewering, levelling, kerbing, flagging, and paving Paradise-street, Providence-street, Mount Pleasant-street, from Manor-street to Providence-street, and Manor-street. Also for levelling, kerbing, flagging, and paving only Mount Pleasant-street from Tame-street to Manor-street for the Audenshaw Local Board. Mr. J. H. Burton, Surveyor, Ashton-under-Lyne :—

Underwood Bros., Dukinfield.
(Accepted at per schedule of prices.)

AUDENSHAW. — For sewering, levelling, kerbing, flagging, and paving Lord-street for the Audenshaw Local Board. Mr. J. H. Burton, Surveyor, Ashton-under-Lyne :—

Worthington & Pownall, Manchester.
(Accepted at per schedule of prices.)

BARMOUTH.—For extension of cast-iron outfall sewer. Mr. Thomas Roberts, Assoc.-M.Inst.C.E., Engineer, Portmadoc :—

Evan Williams, Bangor	£2,980	0	0
Griffith Griffiths, Criccieth	2,966	0	0
Owen Morris, Carnarvon	2,855	0	0
Abraham Williams, Aberdovey* ..	2,400	0	0

[Engineer's estimate, £2,439.]
* Accepted.

BECKENHAM.—For the erection of a residence, for Mr. G. H. Manger. Mr. G. Warren Cooper, architect, Bedford-row, W.C. Quantities by Mr. A. R. Brede, Bedford-row House, W.C. :—

		Billiard-room.
E. R. Palmer, Beckenham	£1,670	.. £200 0 0
Graham & Co., Beckenham ..	1,650	.. 198 10 0
Mid-Kent Building Works, Beckenham	1,600	.. 200 0 0
Mattock Bros., London, N. ..	1,597	.. 193 0 0
Patman & Fotheringham, London, W.C.....	1,585	.. 220 0 0
S. J. Jerrard, Lewisham.....	1,533	.. 193 0 0
C. W. Brice, Beckenham*	1,440	.. 175 0 0

* Accepted.

BROMLEY (Kent) —For the erection of a detached villa residence at South Hill Park, Bromley, for Mr. J. Bramsden. Messrs. Baxter, Payne, & Lepper, architects, Bromley :—

Arnaud & Son	£1,542	0	0
Crossley	1,355	0	0
D. Payne.....	1,239	0	0
Hy. Sanford (accepted).....	1,100	0	0

[All of Bromley.]

CAMBRIDGE.—For erecting new premises at the corner of the Market Hill and Petty Cury, Cambridge, for Mr. W. Bond, J.P. Mr. G. McDonell, architect, London. Quantities by Mr. James Yarrow, surveyor, 16, Milford-street, Cambridge :—

Prime	£5,020	0	0
Bell & Sons	4,574	0	0
Willmott & Sons (accepted)	4,225	0	0

[All of Cambridge.]

CARDIFF —For making roads at Barry, for the Barry Dock Sand Syndicate. Messrs. Richards & Gethin, Surveyors. Quantities by Surveyors :—

Bowers & Co., Hereford	£7,400	0	0
Makay & Co.....	6,872	0	0
Day & Son, Cardiff.....	5,185	0	0
J. L. Pearson.....	5,050	0	0
J. Allen	4,990	0	0
W. Crisp, Barry	4,900	0	0
R Smith, Cardiff (accepted)	4,807	0	0
J. Barstow, Barry	4,688	0	0
D. Love, Barry	4,679	0	0

CARDIFF.—For the erection of three shops in Holton-road, Barry, for Mr. D. Jones. Messrs. Richards & Gethin, architects :—

G. Asbite, Barry	£2,041	0	0

CARDIFF.—For the erection of offices, Barry, for Messrs. D. Davies & Co. Messrs. Richards & Gethin, architects :—

R. Price, Cardiff	£248	15	0
Jones Bros., Cardiff (accepted)	240	0	0

CARDIFF.—For the erection of trimmers' lodge, Barry Docks, for Messrs. L. & H. Gueret. Messrs. Richards & Gethin, architects :—

Richard Price, Cardiff	£170	0	0
M. H. Tape, Penarth.....	157	0	0
Milward & Co., Barry	156	10	0
J. C. Edmunds, Penarth (accepted)..	110	0	0

CARDIFF.—For the erection of temporary offices for H.M. Customs, Barry Docks. Messrs. Richards & Gethin, architects :—

Jones Bros., Cardiff	£840	0	0
E. Turner & Sons	788	0	0
R. Price, Cardiff (accepted).....	758	0	0

CARDIFF.—For forming Belle View-road, Cadoxton, for Mr. Chappell. Messrs. Richards & Gethin, surveyors :—

J. Brock, Barry (accepted)	£450	0	0

CARDIFF.—For the erection of three shops in Holton-road, Barry, for Mr. David Jones. Messrs. Richards & Gethin, architects :—

G. Asbe, Barry.....	£2,105	16	9

CARDIFF.—For the erection of two shops, High-street, Barry, for Dr. Byers. Messrs. Richards & Gethin, architects :—

G. Griffiths, Cardiff..	£1,636	18	3
F. Brailey, Penarth.....	1,620	0	0
W. Crisp, Cardiff.....	1,600	0	0
Jones Bros.	1,550	0	0
R. Price	1,485	0	0
D. J. Price.....	1,438	0	0
J. Jones, Penarth	1,390	0	0
M. H. Tape, Penarth	1,300	0	0
J. C. Edmunds, Penarth (accepted).	1,125	4	3

CARDIFF.—For the erection of forty-two cottages in Lombard-street, Barry, for Messrs. Jenkins & Rees. Messrs. Richards & Gethin, architects :—

J. C. Edmunds, Penarth (accepted)	£4,956	0	0

CARDIFF. — For making Burlington-street, Barry Dock, for Messrs. Jones & Roberts and Mr. J. James. Messrs. Richards & Gethin, surveyors :—

J. Brock, Cadoxton.....	£486	5	8
R. Smith, Cardiff	410	0	0
D. Love, Cadoxton.....	370	3	11
Milward & Co., Cadoxton	365	6	9

CARDIFF.—For the erection of offices at Barry Dock, for Messrs D. Davis & Son. Messrs Richards and Gethin, architects :—

Jones Bros., Cardiff	£310	0	0
R. Price, Cardiff (accepted)	276	15	0

CARDIFF.—For the erection of 94 cottages in Sydenham and Fryatt-streets, Barry Docks, for Mr. J. Milward. Messrs. Richards and Gethin, architects :—

R. Smith, Cardiff	£16,030	0	0
P. Vallis, ,, ...	15,400	0	0
J. C. Edmunds, Penarth	15,000	0	0

CARDIFF.—For the erection of twelve houses in Moor-road, Cadoxton, for Mr. John Morgan. Messrs. Richards & Gethin, architects :—

Messrs. Mathews Bros., Cadoxton (accepted)	£1,800	0	0

JOHANNESBURG (South Africa).—For the erection of an arcade of shops and block of offices, for the Johannesburg Land and Investment Co., Limited. Messrs. Lennox Canning & F. G. Goad, architects, Johannesburg, Transvaal. (Contract No. 1, exclusive of castings, to be supplied by Messrs. Macfarlane & Co., Glasgow.) Quantities by the architects :—

Inkster & Co.....	£16,000	0	0
McColl & Robertson	12,165	0	0
W. White	11,180	0	0
G. H. Langmead	10,500	0	0
Abrey & Co. (withdrawn).....	10,000	0	0
T. M. Cullman (accepted).....	9,782	0	0

LONDON.—For the erection of Mission Hall, Old Montague-street, E., for the Trustees. Mr. A. Beresford Pite, F.R.I.B.A., architect, 5, Bloomsbury-square, W.C. Quantities supplied :—

Barrett & Power.....	£600	0	0
Salt	594	0	0
Knox	589	9	9
Barker	586	0	0
Potterton	583	18	6
Scharcer	578	0	0
Hood	575	5	5
Holland.....	561	0	0
Lusk	550	0	0
Winkley.....	545	0	0
Edmonds	528	0	0
Edwards, jun.	525	0	0

LONDON.—For alteration and fittings at Nos. 91 and 93, Rye-lane, Peckham, for Messrs. Davies Bros. Mr. John James Downes, architect, 11, The Parade, Lewisham High-road, S.E. :—

Parker	£160	0	0
Adams	106	10	0
Best (accepted)	106	0	0

LONDON.—For repairs, additions, and decorations at Tudor Lodge, Dulwich :—

	External.	Internal.
J. Wilson	£1,800	£1,789
W. Downer	1,790	1,780
R. Simmonds	1,777	1,780
T. Thomas.....	1,770	1,698
A. Smith	1,735	1,694

LONDON. — For alterations and additions to 87, Cadogan-place, for Mrs. Barker, under the superintendence of Messrs. Godwin, Basley, & Co., surveyors, 28, Cadogan-place, S.W. :—

Langdale, Hallett, & Co.....	£175	0	0
Lott & Son	169	18	0
Oldrey & Co.....	159	0	0
Webber	152	16	0

LONDON. — For alterations and additions to 43, Flood-street, Chelsea, under the superintendence of Messrs. Godwin, Basley, & Co., surveyors, 28, Cadogan-place, S.W. :—

Langdale, Hallett, & Co.....	£144	10	0
Roberts	117	0	0
Oldrey & Co.....	95	16	0
Webber	81	16	0
Lott & Son	79	19	0

LONDON.—For repairs, &c., to 53, West Cromwell-road, South Kensington, for Mr. T. Huggett. Mr. Walter J. Ebbetts, architect, 115, Strand, W.C. :—

F. Giles & Co.....	£274	16	0
Toten & Sons	175	0	0
W. Steel	169	0	0
J. Barker & Co.	168	0	0
C. F. Kearley	166	0	0

LONDON.—For sanitary work at the Vestry Hall, Camberwell :—

Sanitary Engineering and Ventilating Co.	£385	0	0
Jennings	350	0	0
Bickell	320	0	0
Poole	311	0	0
Coldman	253	10	0
Ham	248	0	0

LONDON. — For the erection of the "Duke of Clarence" public-house, Red Post-lane, Upton Park, E., for Mr. John Hoppe. Mr. Fred. A. Ashton, architect, 177, Romford-road, Stratford, E. Quantities supplied :—

Baxter, Upton Park	£3,890 0 0
Hearle & Son, St. George's, E.	3,883 0 0
Allerton & Fox, West Ham	3,837 0 0
Morter, Stratford	3,770 0 0
North Bros., Stratford	3,658 0 0
Nicholls, Leytonstone	3,520 0 0
Linzell, Tottenham	3,492 0 0
J. & F. Bane, Stratford	3,459 0 0
Wyles (accepted), Upton Park	3,380 0 0
Hood, Bethnal Green	3,365 0 0

[Architect's estimate, £3,575.]

OXTED (Surrey).—For the erection of shops at Oxted. Mr. G. Warren Cooper, architect, Bedford-row, W.C. :—
W. J. Bailey, Croydon (accepted) .. £1,650 0 0

SOUTH MIMMS (Middlesex).—For South Mimms village sewerage, for the Barnet Rural Sanitary Authority. Mr. W. H. Mansbridge, Surveyor :—

Hipwell	£1,745 0 0
Butcher	1,395 0 0
South	1,305 0 0
Aldred	1,188 0 0
Dickson	1,179 17 7
Pizzey	1,170 0 0
Bell	1,159 0 0
Wilkinson Bros.	1,133 0 0
Bloomfield	1,106 0 0
Jackson	1,079 9 0
Bottoms	1,070 0 0
Hill	997 10 0
Ballard	997 0 0
Marriott	970 0 0
Adams	966 0 0
Stroud	938 12 2
Prout	933 6 8
Young & Son (accepted)	915 15 0
*Capper	905 14 6

* Tender incomplete,—schedule not priced out.

TORQUAY. — For new pier and harbour works, Torquay. Mr. J. Abernethy, Engineer :—

	Pier. £.	Quay Wall. £.	Total. £.
Woodhouse & Green, Newport, Mon.	42,839	8,350	51,189
Hill & Son, London	39,720	7,450	47,170
J. Jackson, London	37,960	7,233	45,193
E. G. Perkins, Lymington, Hants	28,000	17,000	45,000
Pethick Bros., Plymouth	35,644	8,800	44,444
T. W. Ridley, Middlesbrough	36,600	6,900	43,500
J. H. Lawton, Bristol.	38,400	6,600	41,400(?)
R. Lean, Newport, Monmouthshire	34,000	6,000	40,000
J. L. Whettan, Weymouth	32,707	6,535	39,242
F. Matthews, Babbacombe	27,200	4,800	32,000
John Reed, Plymouth	25,400	3,500	28,900
J. Cochrane & Sons,* Westminster	25,150	4,600	29,750

* Accepted.

Building Nos. 8 and 9, Arundel-street, W.C.—For "Garnet," in last line of the list of tenders for this job, which appeared on p. 35 of last week's issue of the *Builder*, read "*A. & W. Garnar, Peckham.*"

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office, 19s. per annum (or 4s. 9d. per quarter), can ensure receiving "The Builder" by *Friday Morning's post.*

TO CORRESPONDENTS.

F. T. (after previous experience, we cannot accept your report).—E. O. S., Berlin.—F. R. W.—F. & G.—W. P. B. (defects in drainage cannot be considered a matter specially connected with schools any more than with any other class of building).—J. M. H.—I. C. W., "Tall chimneys" (if "H. W. T." will send his address he shall have answers to his questions. The subject has been fully discussed in our columns already).—J. D. M. (too late).—S. H. (too late).—A. & W. G. (we printed the list as we received it, but have made the correction).

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor

PUBLISHER'S NOTICES.

***Registered Telegraphic Address*, "THE BUILDER, LONDON."**

THE INDEX and TITLE-PAGE for Volume LVII. (July to Dec. 1889) were given as a Supplement with the Number for Jan. 11th

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Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY, but those intended for the front Page should be in by the same hour on WEDNESDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY mornings.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

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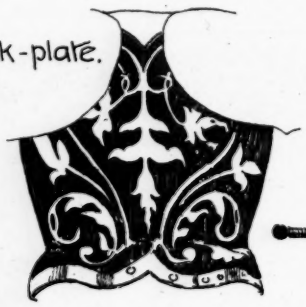
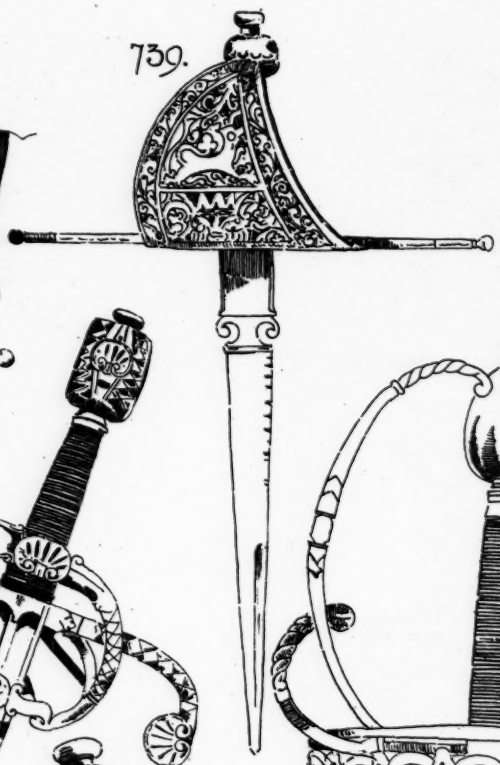
LONDON: 352 to 362, EUSTON ROAD.
LIVERPOOL: 6 and 8, HATTON GARDEN.
GLASGOW: 47 & 49, ST. ENOCH SQUARE.

№ 598.

Three Quarter Black & Bright Suit - German.



Back-plate.



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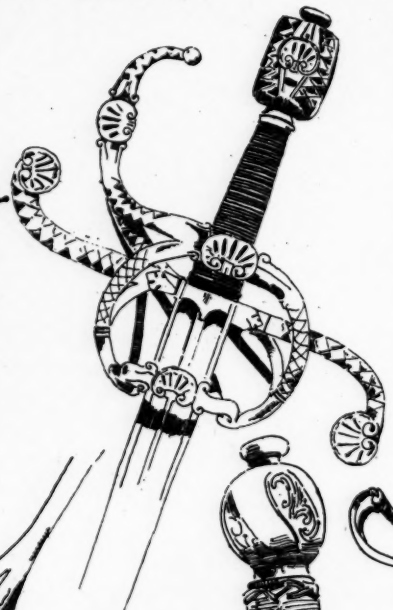
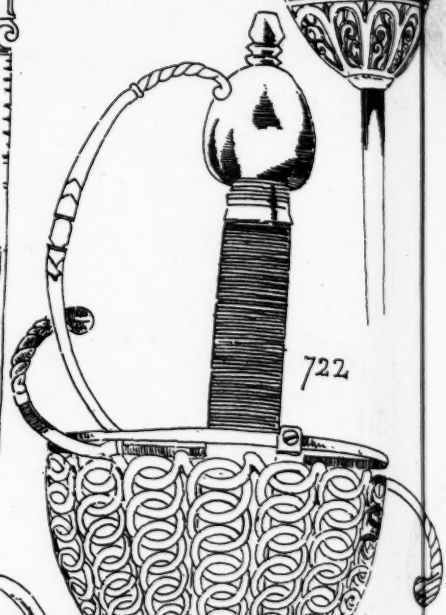
717.





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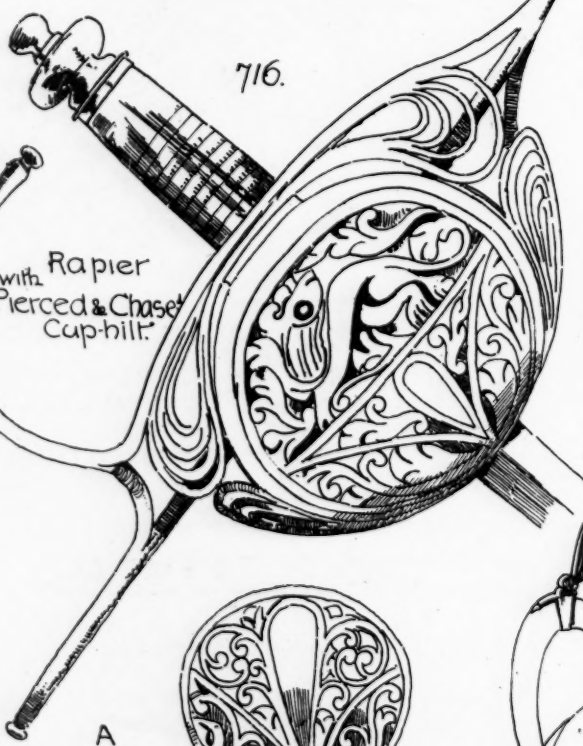
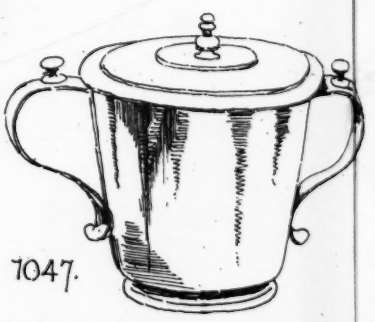


716.

with Rapier Pierced & Chased Cup-hilt.

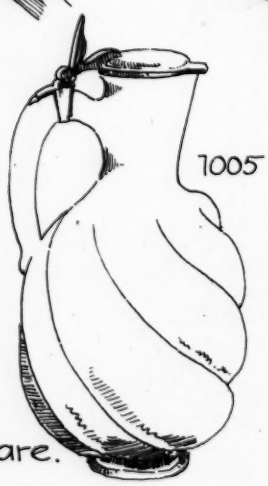
678.



1047.

Silver Mug with double handle said to have belonged to Dr Dee.

A Chased Cup hilt.

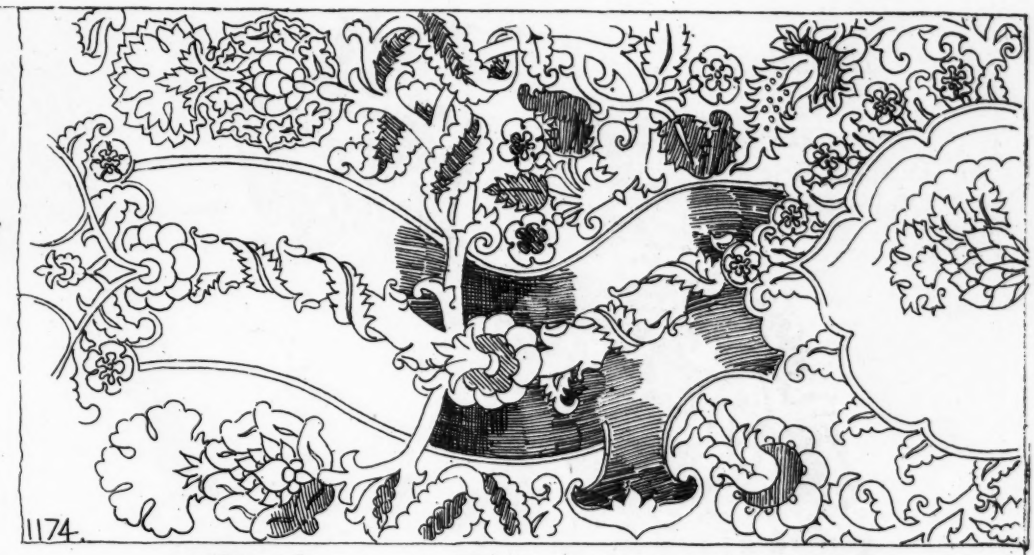


1005

Fluted Tudor Wine Jug of white ware.

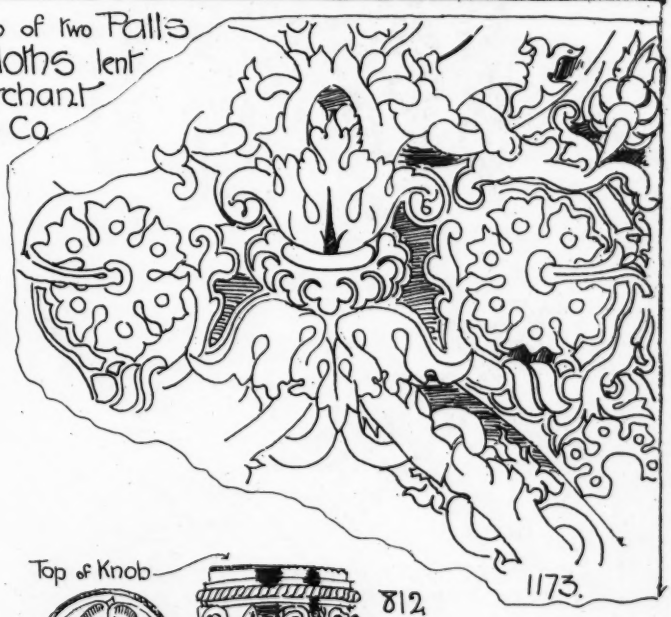
Sketches from The Tudor Exhibition.

814
Silver-Gilt Standing Cup and Cover 1523-4.
Lent by The Barber Surgeons Co.



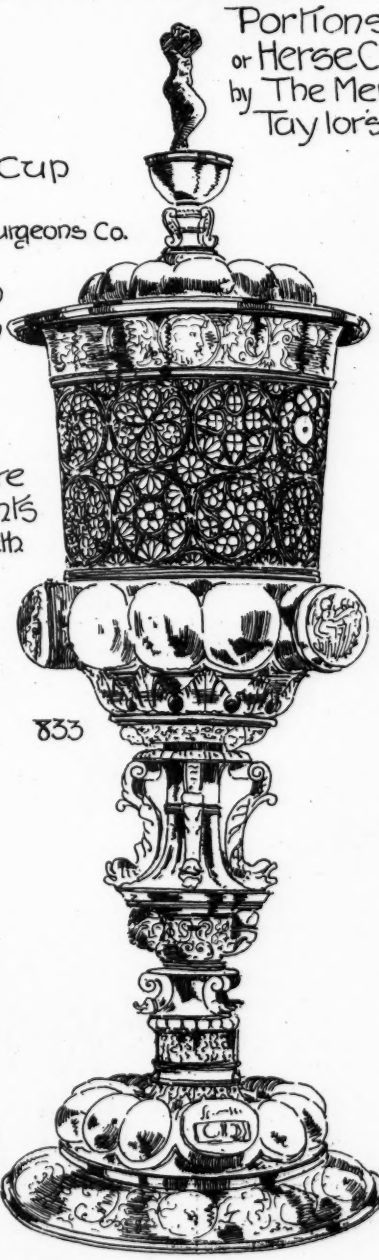
1174.

Portions of two Palls or Herse Cloths lent by The Merchant Taylor's Co



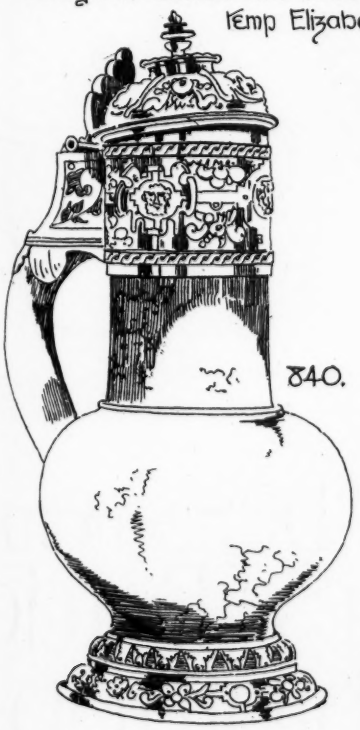
1173.

Silver Gilt Standing Cup and Cover, given by Queen Elizabeth to Sir Francis Drake circa 1580.



833

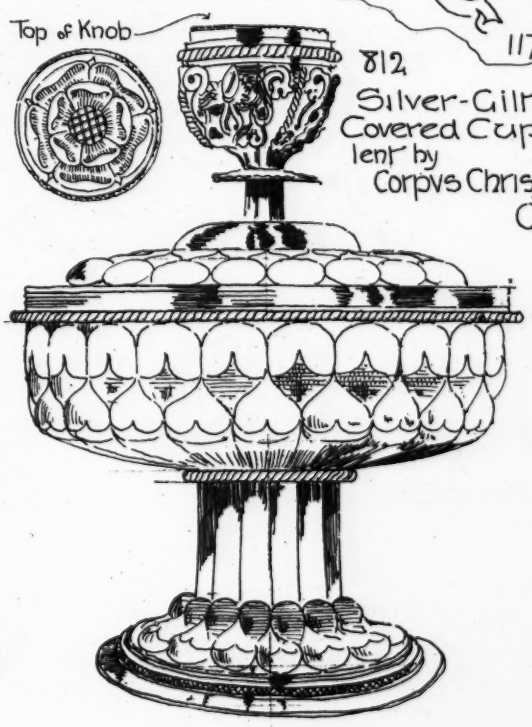
Jug of German Stone-ware in English Silver Gilt mounts temp Elizabeth



840.

812
Silver-Gilt Covered Cup 1515-16 lent by Corpus Christi Coll: Oxford.

Top of Knob



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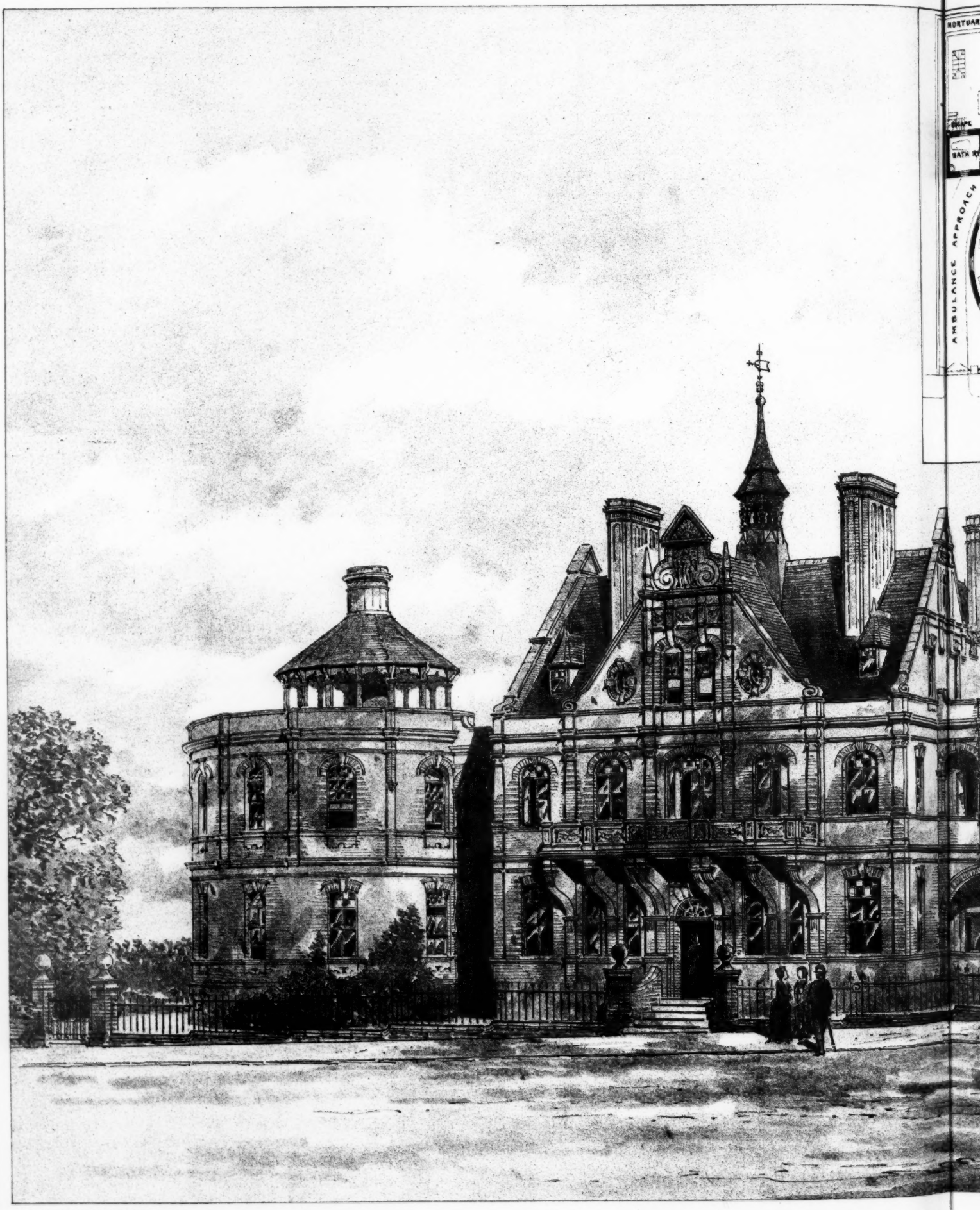
THE WEIGH-HOUSE CHAPEL, MAYFAIR, LONDON.—

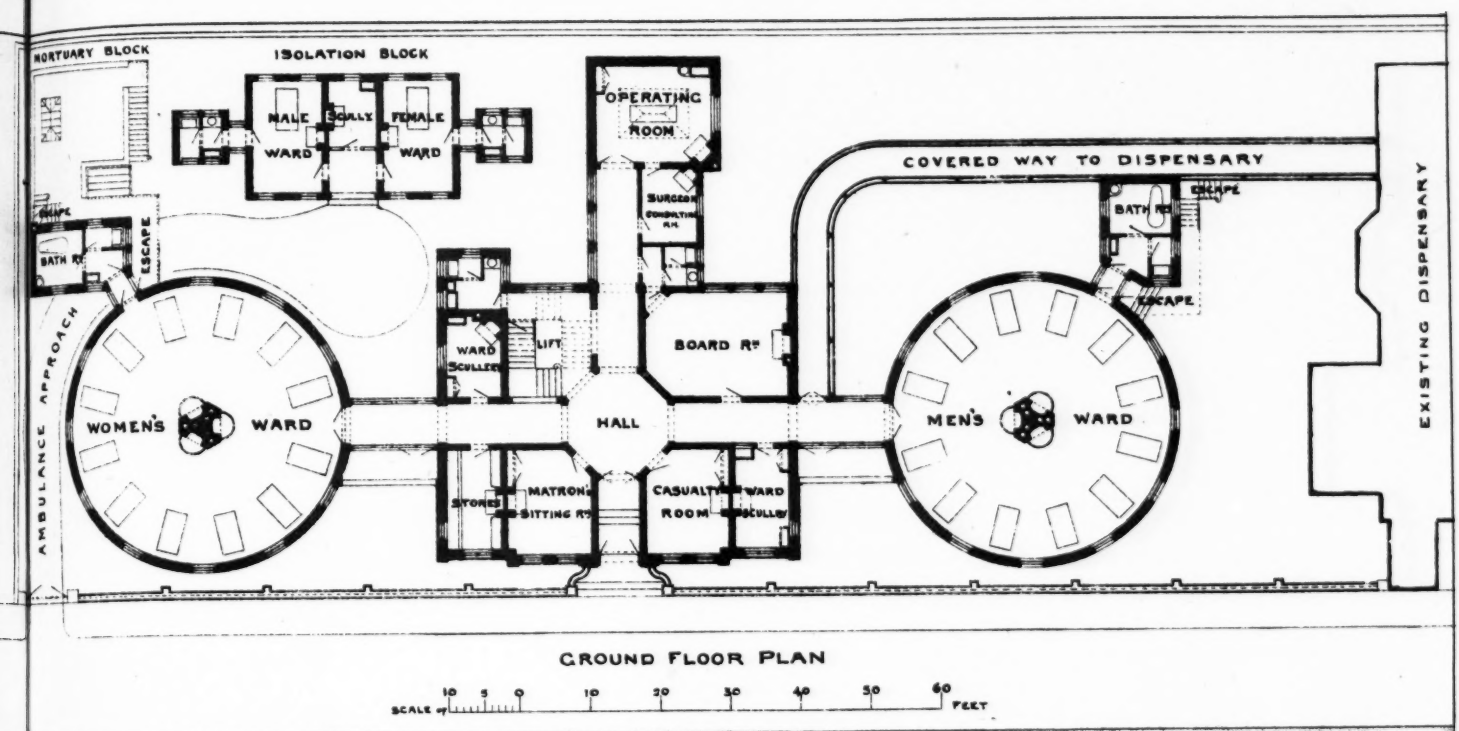
PHOTO-LITHO. SPRAGUE & Co., 22, MARTINS LANE, CANNON ST., LONDON, E.C.

IR, LONDON.—Mr. A. Waterhouse, R.A., Architect.



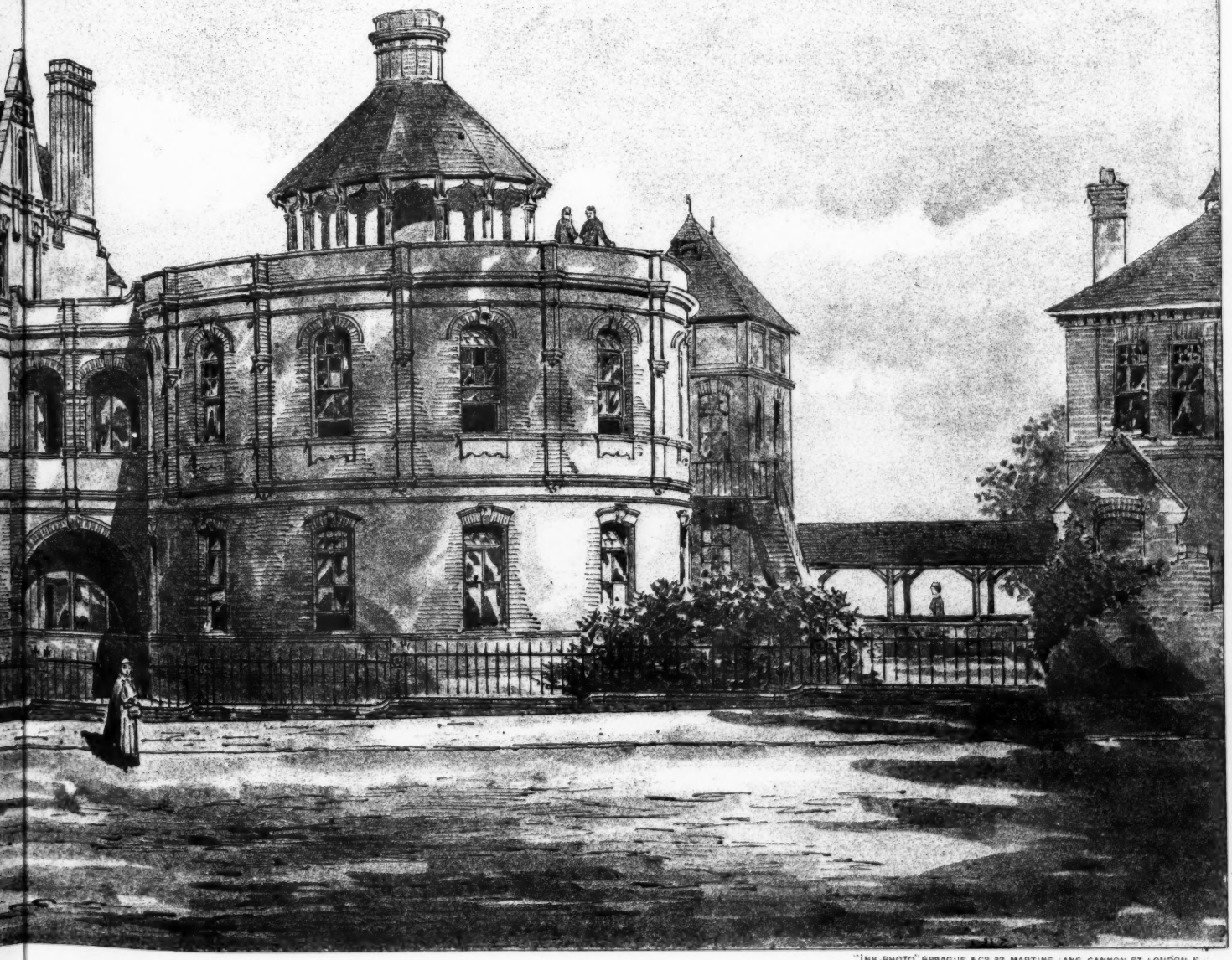
DRAWN BY MR E HODKINSON

DESIGN FOR PROPOSED WEST HAM HOSPITAL.—MR. ARTHUR CROW, A



GROUND FLOOR PLAN

SCALE OF 10 5 0 10 20 30 40 50 60 FEET



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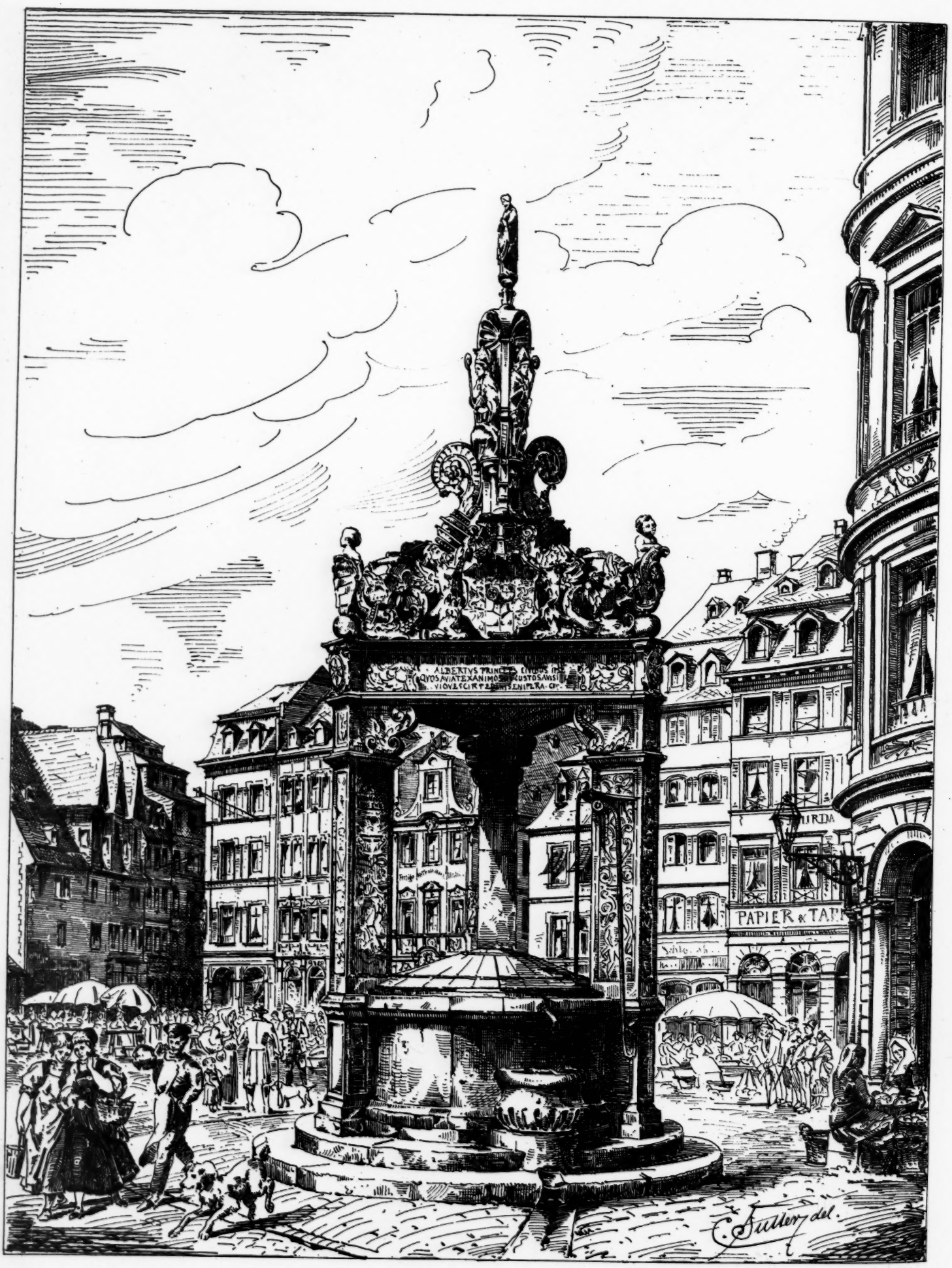
CROW, A.R.I.B.A., AND MR. PHILIP H. TREE, A.R.I.B.A., JOINT ARCHITECTS.



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THE OLD FOUNTAIN, MARKET PLACE, MAINZ.

Ground Plan.

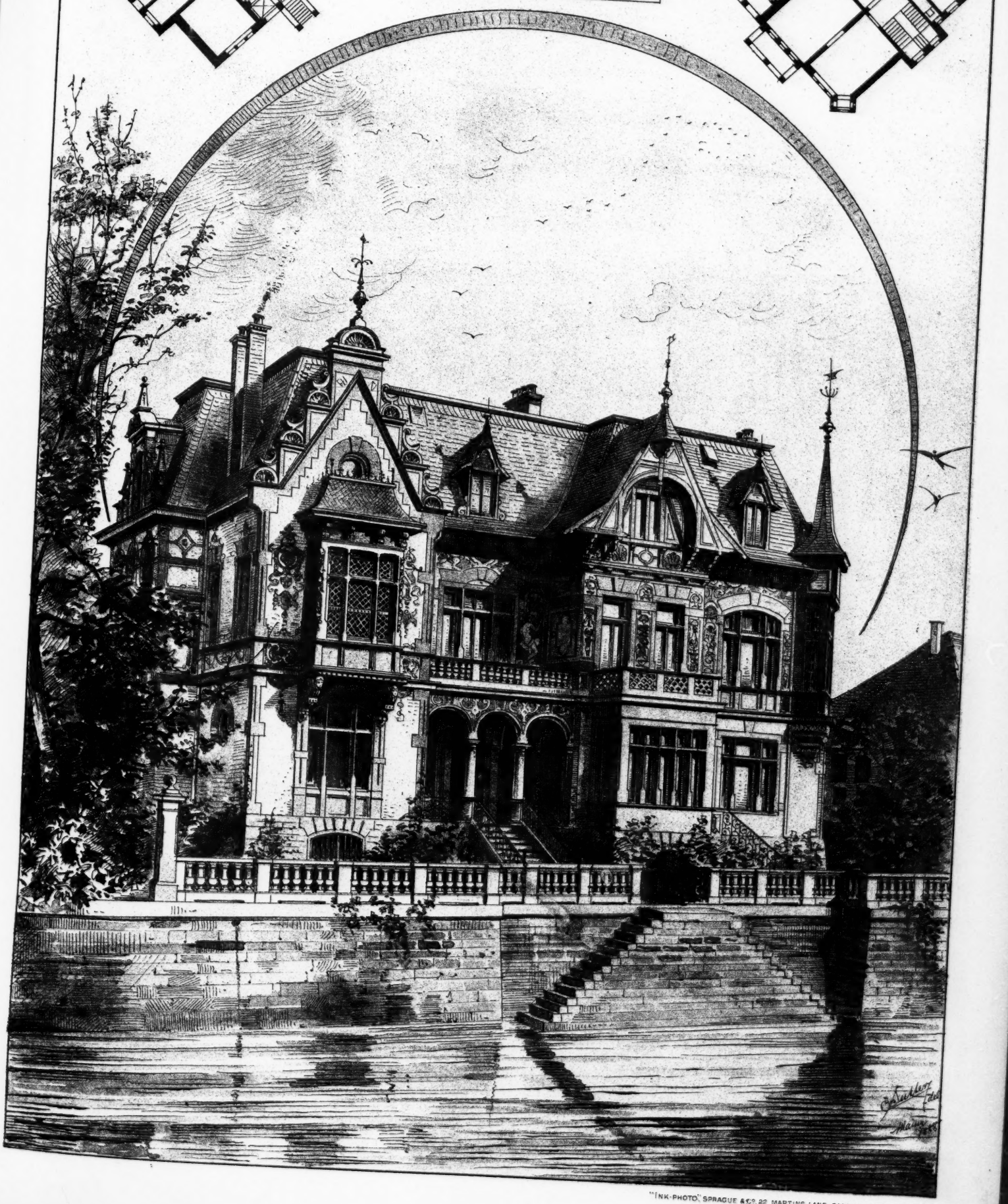
STRASSBURG i.E.

Cottage

Mr. G. Ziegler, Architect
Karlsruhe

Chamber Plan

10 9 8 7 6 5 4 3 2 1 0 10M.



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